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**Gerardo A. Aymard C.**

Lectotypifications and nomenclatural notes of José Jerónimo Triana's species of Dilleniaceae 77

**Carlyle A. Luer**

*Icones Stelidarum (Orchidaceae) Colombiae IV* 81

**Xavier Cornejo**

*Neocapparis*: generic status and new name for *Capparidastrum* subgenus *Pachycarpum* (Capparaceae) 113

**Xavier Cornejo, Dieter Wasshausen, and Carmen Bonifaz**

*Dicliptera francodavilae* (Acanthaceae): A new species from the coastal dry forests of the province of Guayas, Ecuador 121

**José Iranildo Miranda de Melo**

New combinations in *Euploca* Nutt. (Heliotropiaceae) from Mexico and Central America 125

**Van Duy Nong and Tao Chen**

*Mussaenda reflexisepala*, a new species of Rubiaceae from Vietnam 127

**A. L. V. Toscano de Brito**

*Zygostates luerorum*—A new species from Bolivia in the *Ornithocephalus* clade of subtribe Oncidiinae (Orchidaceae) 133

**Tracy Commock, Philip E. Rose, Kanchi N. Gandhi, Keron C. St. E. Campbell, Kenneth J. Wurdack, Javier Francisco-Ortega, and Brett Jestrow**

Typification and nomenclature of five taxa endemic to Jamaica 137

**Ihsan A. Al-Shehbaz**

Nomenclatural adjustments in North American *Arabis*, Chinese *Hilliella*, and South American *Neuontobotrys* (Brassicaceae) 141

**Gustavo A. Romero-González, Germán Carnevali, Ramón E. López, and Simeón C. Pérez**

*Catasetum ×dunstervillei* (Orchidaceae: Catasetinae), a natural hybrid confirmed by artificial hybridization 145

**Toshio Yoshida and Hang Sun**

*Meconopsis Lepida* and *M. Psilonomma* (Papaveraceae) Rediscovered and Revised 157

Index to New Names and Combinations 193

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# LECTOTYPIFICATIONS AND NOMENCLATURAL NOTES OF JOSÉ JERÓNIMO TRIANA'S SPECIES OF DILLENIACEAE

GERARDO A. AYMARD C.<sup>1</sup>

**Abstract.** The preparation of treatments of Dilleniaceae for the Flora of Colombia and Flora of Ecuador projects required a literature survey, visits to herbaria, and the analysis of types and general collections found on the Internet. The results indicate the need to lectotypify several species of Dilleniaceae described by the Colombian botanist José Jerónimo Triana. These taxa are based on specimens collected during Triana's participation in the Colombian Chorographic Commission ("Comisión Corográfica") from 1851 to 1857, under the supervision of Agustín [Giovanni Battista Agostino] Codazzi. Lectotypes for the following six species are proposed herein: *Davilla densiflora*, *Ricaurtea congestiflora*, *Ricaurtea nitida*, *Tetracera castaneifolia*, *Tetracera hydrophila*, and *Tetracera sessiliflora*.

**Resumen.** La preparación de los tratamientos de Dilleniaceae para las Floras de Colombia y Ecuador han requerido de una revisión de literatura, visitas a numerosos herbarios, y el análisis de material tipo y colecciones en el Internet. Como resultado se ha observado la necesidad de realizar lectotipificaciones de varias especies descritas por el botánico colombiano José Jerónimo Triana en el siglo XIX. Estas especies están basadas en ejemplares colectados por Triana durante su participación en la Comisión Corográfica, dirigida por Agustín [Giovanni Battista Agostino] Codazzi, desde 1851 hasta 1857. En la presente contribución se proponen lectotipos para las siguientes seis especies: *Davilla densiflora*, *Ricaurtea congestiflora*, *Ricaurtea nitida*, *Tetracera castaneifolia*, *Tetracera hydrophila*, and *Tetracera sessiliflora*.

**Keywords:** Dilleniaceae, Lectotypification, José Jerónimo Triana, Colombia

The designation of lectotypes is necessary because holotypes were not usually selected for most of the species described in the 18th and 19th centuries, particularly when authors cited several collections or syntypes (McNeil, 2014).

Many descriptions often referred to a "type" in a superficially and ambiguous way, which again often requires the designation of a lectotype. The nomenclatural rules define a lectotype as "a specimen or other element selected from the original material" (McNeil et al., 2012). In the past, many authors operated under the now discarded assumption that the first specimen cited was automatically the type, a purely bibliographical exercise with no element of selection or choice (Prado et al., 2015). Moreover, references to a "type" were often to "a collection" with several replicates, in the same or in different herbaria, some examined by the author or not, or to a collection locality, where the same collector or several collectors may have gathered specimens. In most flowering plant groups, collection with several replicates in different herbaria could have been made from a single individual, but in other groups with small individuals it is not always true that representatives of a particular collection represent the same species. Currently, the idea is to choose a specimen that the author had at hand ("original material") and alternatively might have had designated as holotype.

The plants described by José Jerónimo Triana (1828–1890) in 1858 and then by Triana and Jules Émile Planchon (1833–1990) in 1862 typically need the designation of lectotypes (Kirkbride Jr., 1982). Triana was a notable Colombian medical doctor and botanist who was an active participant in the Colombian Chorographic Commission ("Comisión Corográfica") from January 1850, to December 1856, under the supervision of Agustín [Giovanni Battista Agostino] Codazzi (Dugand, 1944; Díaz-Piedrahita, 1988, 1996; Acuña, 2011). He collected nearly 8,000 specimens during his travels (Parra-Osorio, 2017). Working on a *Prodromus florum Novo-granatensis* (Díaz-Piedrahita & Lourteig, 1989), Triana was the first Latin-American botanist to study Dilleniaceae (Triana, 1858; 1862; Aymard, 1997, 2007). Typically, however, he only provided a general type location in his protologues, or quoted several collections from places closely located, and many species need some basic nomenclature work as far as type designation is concerned.

This contribution precedes the preparation of treatments of Dilleniaceae for the Flora of Colombia and the Flora of Ecuador projects, the goal of which is to clarify the status, nomenclature, and typification of six names from the genera *Davilla* Vand., *Doliocarpus* Dol., and *Tetracera* L.

## MATERIAL AND METHODS

Taxa are treated in alphabetical order, the accepted names are in bold face, and the synonyms are in italics. The protologues in Triana (1858) and Triana and Planchon (1862) were consulted and the specimen citations are here quoted *verbatim*. The selection of lectotypes was based on the protologues and the examination of type specimens.

Triana's collections at COL were consulted and those elsewhere were mostly examined at Global Plants (JSTOR, 2017). In addition, Tropicos (2015) provided nomenclatural data and links to the Biodiversity Heritage Library (BHL, 2015), which offered access to botanical literature published during the last three centuries.

The author is grateful to Kanchi Gandhi (GH) for his helpful comments, to Carlos Parra O. (COL) for providing literature about J. J. Triana, and the "Asociación Colombiana de Herbarios" and Felipe Cardona (HUA) who made possible a tour of the Colombian herbaria.

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## TAXONOMIC TREATMENT

*Davilla densiflora* Triana & Planchon, Ann. Sc. Nat. 4, Sér. Bot. 17: 18–19. 1862. TYPE: [COLOMBIA] Nouvelle-Grenade: [Meta], Province de Bogotá, Villavicencio, Llano de San Martín, bassin du Meta, 400 m, January 1856, *J. J. Triana s.n.* (4763–2 (this is not a field collection number, see explanation below) (Lectotype, here designated: COL; Isolectotypes: BM [image seen], G [image seen], P [image seen], W [image seen])).

**Protologue specimen citation:** “Villavicencio, au pied de la Cordillère de Bogotá, côté oriental, bassin du Meta, sur les lisières des forêts, 400 mètres, (Tr.).”

**Residual syntype:** [COLOMBIA] Nouvelle-Grenade: [Meta], Province de Bogotá, bassin du Meta, 300 m, January 1851, *J. J. Triana s.n.* (K [image seen]).

**Typification commentary:** The authors (Kirkbride Jr., 1982) cited only a general locality and later Kubitzki (1971) cited “Triana (COL, W), Kolumbien, Meta.” Two specimens collected in the type locality were located, and the one matching the protologue is chosen here as the lectotype. Fraga (2012) observed that this taxon did not have a type specimen and he proposed a lectotypification based on the following specimen: “Colombia, Bogotá, Villavicencio, Llano de San Martín, 1856, *J. J. Triana*, 4763-2.” However, the supposed Triana’s field collection numbers annotated in almost all of his labels are in fact a generic number based on Endlicher’s system (see below), and the number after the comma refers to the number of replicates of the collection (Kirkbride Jr., 1982). This system was used by J. J. Triana to handle his collections.

Stephan Ladislaus Endlicher (1804–1849) set up a system of plant genera arranged according to a natural order, in which he treated and numbered 6,835 genera of plants (6,285 of vascular plants) called “*Genera Plantarum Secundum: Ordines Naturales Disposita*” (Endlicher, 1836–1841). It is imperative for students of the flora of Colombia to understand Triana’s numbering system, and that the set of Triana’s specimens at COL is a duplicate set of that at the BM and other European herbaria (Kirkbride Jr., 1982).

**Current status:** *Davilla densiflora* is a synonym of *Davilla nitida* (Vahl) Kubitzki (Kubitzki, 1971; Fraga, 2012; Aymard & Kelloff, 2016).

*Ricaurtea congestiflora* Triana, Ann. Sci. Nat., Bot. sér. 4 9: 48 (1858). TYPE: [COLOMBIA] *Crescit in valle fluminis Metae et indeclivitate orientali Andium Bogotensium usque ad altitudinem 1300 metrorum*, *J. J. Triana s.n.* (Lectotype designated here: COL; Isolectotype: P [image seen]).

**Homotypic synonym:** *Doliocarpus congestiflorus* (Triana) Gilg & Werderm., Nat. Pflanzenfam. (ed. 2) 21: 21. (1925).

**Protologue specimen citation:** [COLOMBIA. Meta]: “*Crescit in valle fluminis Metae et indeclivitate orientali Andium Bogotensium usque ad altitudinem 1300 metrorum.*”

**Typification comment:** Triana cited only a general locality without specifying any collection or *exsiccata*. Kubitzki (1971) cited “syntypes” at COL, K, and P. In the current study, it was found that only a single collection was made in the type locality region and that the specimens housed at COL, K, and P, as cited by Kubitzki, constitute syntypes. Of these, the COL specimen is here designated as the lectotype.

**Current status:** *Ricaurtea congestiflora* is a synonym of *Doliocarpus dentatus* (Aubl.) Standl. subsp. *dentatus* (Kubitzki, 1971; Gallardo-Hernández, C. 2004).

*Ricaurtea nitida* Triana, Ann. Sci. Nat. Bot., sér. 4: 47 (1858). TYPE: [COLOMBIA] Nouvelle-Grenade: [Tolima], Prov. Mariquita et Neiva, Vallée du Magdalena, 500 m, 1 August 1853, *J. J. Triana s.n.* (Lectotype, here designated: COL).

**Homotypic synonym:** *Doliocarpus nitidus* (Triana) Triana & Planch., Ann. Sci. Nat., Bot. sér. 4, 17: 16. 1862.

*Doliocarpus nitidus* (Triana) Gilg & Werderm., Nat. Pflanzenfam. (ed. 2) 21: 21 (1925), isonym.

**Protologue specimen citation:** “*Crestic in fluminis Magdalena regione calidissima usque ad altitudinem 1000 metrorum.*”

**Residual syntypes:** [COLOMBIA] Nouvelle-Grenade: [Tolima], El Espinal, Vallée du Magdalena, 1200 m, July 1853, *J. J. Triana s.n.* (BM [image seen], COL, P [image seen], US [image seen], W [image seen]). [COLOMBIA] Nouvelle-Grenade: [Tolima], Prov. Mariquita - Neiva, 500 m, 01-08-1853, *J. J. Triana s.n.* (COL). [COLOMBIA] Nouvelle-Grenade: Prov. Bogotá et Mariquita, Vallée du Magdalena, 500–000 m, *J. J. Triana s.n.* (P [image seen]). [COLOMBIA] Nouvelle-Grenade: Prov. Bogotá et Mariquita, Socorro, Vallée du Magdalena, 1200 m, *J. J. Triana s.n.* (BM [image seen], K [image seen], G [image seen], P [image seen], US [image seen], W [image seen]).

**Typification commentary:** Triana (1858) described *Ricaurtea* to honor captain Antonio Ricaurte Lozano (1786–1814), a “Neogranadino” independence hero, based in at least five of his own collections gathered in 1854. Triana, however, cited only a general type locality (Triana, 1858). Later, Triana and Planchon (1862) after studying another collection (i.e., *Goudot s.n.*) and finding no significant distinctions to keep both genera, transferred *Ricaurtea nitida* to *Doliocarpus*, a genus described by Daniel Rolander in 1756. This time the authors cited a more detailed locality (“Prov. de Mariquita et Neiva, vallée du Magdalena, entre 300–1200 mètres d’attitude”), but without referring any particular specimen, and cited Goudot’s collection as well (Triana & Planchon, 1862). Kubitzki (1971) cited “Kolumbien, Triana a. 1851–59 (BM, COL, P, W).”

**Current Status:** *Ricaurtea nitida* is a synonym of *Doliocarpus nitidus* (Triana) Triana & Planchon.

*Tetracera castaneifolia* Triana & Planchon, Ann. Sci. Nat., Bot., sér. 4, 17: 22–23. 1862, as “*castaneaefolia*.” TYPE: [COLOMBIA] Nouvelle-Grenade: [Meta] Apiai, dans les Llanos de San Martín, bassin du Río Meta, 500 m, 1856, *J. J. Triana s.n.* (Lectotype, designated here: P [image seen]).

**Protologue specimen citation:** “*Apiai, dans Les Llanos de San Martín, Bassin du Río Meta, alt. 500 mètres.*”

**Residual syntype:** [COLOMBIA] Nouvelle-Grenade: Province de Bogotá: plaine du Meta, 300 m, 1856, *J. J. Triana s.n.* (P [image seen]).

**Typification comment:** Triana and Planchon (1862) cited only a general type locality. Kubitzki (1970) cited an “isotype” of this species and provided the following

information: “Meta, Llanos de San Martín, Triana (P).” Since a holotype never existed, Kubitzki’s usage of “isotype” is construed as a correctable error for the term lectotype (ICN Art. 9.9; McNeill & al., 2012). However, the author located two specimens collected in the general type locality and, therefore, Kubitzki’s citation is assumed to be the first-step lectotypification. Of the two specimens, the one that more closely matches the protologue is designated here as the second-step lectotype (ICN Art. 9.17; McNeill & al., 2012).

**Current Status:** *Tetracera castaneifolia* is a synonym of *Tetracera volubilis* L. subsp. *volubilis* (Kubitzki, 1970).

**Tetracera hydrophila** Triana & Planchon, Ann. Sci. Nat., Bot., sér. 4, 17: 20. 1862. TYPE: [COLOMBIA] [Colombia] Nouvelle-Grenade [Nariño]: Provincia de Barbacoas, Río Telembí und Río Patia, Caño de Chimbusa, 20 mt, 1853, *J. J. Triana s.n.* (Lectotype, here designated: G [image seen]). Isolectotypes: BM [image seen], BR [image seen], K [image seen], P [image seen], W [image seen]).

**Protologue specimen citation:** “Bords des cours d’eau; Rio Patia, Rio Telembí et Caño de Chimbusa, alt 20 mètres, prov. de Barbacoas, près de la côte du Pacifique.”

**Residual syntype:** [COLOMBIA] Nouvelle-Grenade [Nariño]: Río Telembí, 1853, *J. J. Triana s.n.* (P [images seen]). [COLOMBIA] Nouvelle-Grenade [Nariño]: Caño de Chimbusa, Rio Patia, 1853, *J. J. Triana s.n.* (P [image seen]). [COLOMBIA] Nouvelle-Grenade [Nariño]: Bords des rivières de Patia et de Telembí, 1853, *J. J. Triana s.n.* (NY [image seen], W [image seen]).

**Typification comment:** Triana and Planchon (1862) described *Tetracera hydrophila* based on four of Triana’s collections, but within the protologue cited only a general type locality and mentioned three watercourses (“Río Patia, Río Telembí et Caño de Chimbusa”). Kubitzki (1970) cited these three localities without specifying a particular collection.

*Tetracera sessiliflora* Triana & Planchon, Ann. Sci. Nat., Bot., sér. 4, 17: 21 1862. TYPE: [COLOMBIA] Nouvelle-Grenade [Cundinamarca]: Vallée du Magdalena, La Mesa (Guaduas), 400–200 mètres, 1854, *J. J. Triana s.n.*

(Lectotype, here designated: G [image seen]; Isolectotype: P [image seen]).

**Specimen citation:** “Villeta, Guaduas, La Mesa, etc., sur le versant occidental de la cordillère de Bogotá, et dans la vallée du Magdalena, 400–1200 mètres (Tr.), Garrapata, sur le fleuve Magdalena, alt. 600 mètres (Humb. & Bonpl.); Mendez et Guaduas (Goudot); Panamá (Weddell).”

**Residual syntype:** [COLOMBIA] Nouvelle-Grenade: Prov. de Bogotá. Magdalena, 1000 m, 1854, *J. J. Triana s.n.* (BM [images seen], US [images seen]). [COLOMBIA] Nouvelle-Grenade [Cundinamarca]: Prov. de Neiva et Bogotá, Vallée du Magdalena, La Mesa, Villeta, 400–1200 mètres, 1854, *J. J. Triana s.n.* (P [image seen]). [COLOMBIA] Nouvelle-Grenade: Prov. de Bogotá et Mariquita. Vallée du Magdalena, 500–1200 m, 1854, *J. J. Triana s.n.* (K [images seen]). [COLOMBIA] Nouvelle-Grenade: Prov. de Bogotá, Villeta, 1200 mètres, 1854, *J. J. Triana s.n.* (BM [images seen]). [COLOMBIA] Nouvelle-Grenade [Cundinamarca]: Vallée du Magdalena, Guaduas, *J. Goudot 3* (P, cited by Triana and Planchon, 1862; Kubitzki, 1970). [COLOMBIA] Nouvelle-Grenade: Crescit in ripa fluminis Magdalenae, prope Garapatas, alt. 80–100 hex. A. von Humboldt & A. Bonpland s.n. (P [image seen]). Panama: *H. A. Weddell s.n.* (cited by Triana & Planchon, 1862; Kubitzki, 1970).

**Typification comment:** Triana and Planchon (1862) cited “*Tetracera volubilis* HBK., Nov. Gen. et sp. V, 119[1821], non L. [1753]” as a synonym. Had Humboldt, Bonpland, and Kunth described *T. volubilis* as a new species, he would have created a later homonym, and it would have made Triana and Planchon’s *T. sessiliflora* a new name for a later homonym; however, when the original work is consulted, it is evident that the authors did not describe *T. volubilis* as a new species, but actually used Linnaeus’ 1753 name for their species treatment. Thus it is asserted here that Triana and Planchon (1862) published a new species and included “*Tetracera volubilis*” *sensu* Kunth, non L. (1753) as a synonym. Kubitzki (1970) cited a few of the specimens cited above as syntypes (Kubitzki, 1970). One of Triana’s collections housed at G is selected here as the lectotype.

**Current status:** *Tetracera sessiliflora* is a synonym of *Tetracera portobellensis* Beurl. (Kubitzki, 1970; González-Arce, 2010).

#### LITERATURE CITED

- ACUÑA, R. 2011. José Jerónimo Triana (heredero de una tradición botánica). Cuadernos de pioneros de museología. Universidad Nacional de Colombia, Bogotá, Colombia.
- AYMARD, G. 1997. Dilleniaceae Novae Neotropicae V. El género *Doliocarpus* en Colombia. Anales Jardín Bot. de Madrid. 55: 17–30.
- . 2007. Two new species of *Doliocarpus* (Dilleniaceae) from Colombia. Novon 17: 288–293.
- AND C. KELLOFF. 2016. 40. Dilleniaceae. Pages 1–41 in S. MOTA DE OLIVEIRA AND M. J. JANSEN JACOBS, EDS. Flora of the Guianas. Ser. A, Phanerogams, Fascicle 31.
- BHL. 2015. Biodiversity Heritage Library. A consortium of natural history and botanical libraries. <http://www.biodiversitylibrary.org/>
- DÍAZ-PIEDRAHITA, S. 1988. José Jerónimo Triana (Rasgos biográficos). Trianea 1: 1–4.
- . 1996. José Jerónimo Triana (Naturalista multifacético). Biblioteca breve, Biografía de las Ciencias en Colombia. Fondo Fen Colombia, Bogotá.
- AND A. LOURTEIG. 1989. Génesis de una flora. Acad. Colomb. Cienc. Ex. Fis. Nat. Colección E. Pérez-Arbeláez 2. Bogotá.
- DUGAND, A. 1944. Itinerarios botánicos de José Jerónimo Triana. Revista. Rev. Acad. Colomb. Cienc. Ex. Fis. Nat. 5(20): 483–489.
- ENDLICHER, S. L. 1836–40. Genera Plantarum: Secundum Ordines Naturales Disposita. Fr. Beck, Wien.
- FRAGA, N. C. 2012. Filogenia e revisão taxonômica de *Davilla* VAND. (Dilleniaceae). Ph.D. Dissertation, Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas, Departamento de Botânica. Belo Horizonte, Brasil.
- GALLARDO-HERNÁNDEZ, C. 2004. Dilleniaceae. Fl. Veracruz 134: 1–27.



- GONZÁLEZ-ARCE, L. A. 2010. Dilleniaceae. Pages 203–212 in V. B. E. HAMMEL, M. H. GRAYUM, C. HERRERA AND N. ZAMORA, EDS. *Manual de Plantas de Costa Rica V. Monogr. Syst. Bot. Missouri Bot. Gard.* Vol. 119.
- JSTOR. 2016. Global Plants. Primary Sources. Available from <http://www.Jstor.org/> (accessed 17 June 17, 2017).
- KIRKBRIDE, JR. J. 1982. Rubiaceae types in the Triana collections at the Instituto de Ciencias Naturales, Universidad Nacional, Bogotá, Colombia. *Taxon* 31(2): 303–307.
- KUBITZKI, K. 1970. Die Gattung *Tetracera* (Dilleniaceae). *Mitt. Bot. Staatsamml. München* 8: 1–218.
- . 1971. *Doliocarpus*, *Davilla*, und Verwandte Gattungen (Dilleniaceae). *Mitt. Bot. Staatsamml. München* 9: 1–105.
- MCNEILL, J. 2014. Holotype specimens and type citations: general issues. *Taxon* 63: 1112–1113.
- , F. R. BARRIE, W. R. BUCK, V. DEMOULIN, W. GREUTER, D. L. HAWKSWORTH, P. S. HERENDEEN, S. KNAPP, K. MARHOLD, J. PRADO, W. F. PRUD'HOMME VAN REINE, G. F. SMITH, J. H. WIERSEMA, AND N.J. TURLAND. 2012. International Code of Nomenclature for Algae, Fungi, and Plants (Melbourne Code). *Regnum Vegetabile* 154: 1–240. Koeltz Scientific Books, Königstein. Germany. <http://www.iapt-taxon.org/nomen/main.php?page=title>
- PARRA-OSORIO, C. A. 2017. El Herbario Nacional Colombiano. Pages 158–171 in G. SILVA-CARRERO, ED. *Naturaleza en Observación. Colección del Sesquicentenario 1/1*. Universidad Nacional de Colombia, Bogotá.
- PRADO, J., R. Y. HIRAI, AND R. C. MORAN. 2015. Proposals concerning inadvertent lectotypifications (and neotypifications). *Taxon* 64: 651.
- TRIANA, J. J. 1858. Choix de plantes de la Nouvelle Grenade. *Ann. Sci. Nat. Bot.*, sér. 4, 9(1): 36–58.
- AND J. E. PLANCHON. 1862. *Prodromus florum Novogranatensis*. *Ann. Sci. Nat.* 4, Sér. Bot. 17(1): 5–64.
- TROPICOS. 2015. Tropicos.org: Nomenclatural, bibliographic, and specimen data accumulated in MBG's electronic databases. Missouri Botanical Garden. <http://www.tropicos.org>

## ICONES STELIDARUM (ORCHIDACEAE) COLOMBIAE IV<sup>1</sup>

CARLYLE A. LUER<sup>2</sup>

**Abstract.** An additional fifty new species of *Stelis* (Orchidaceae) from Colombia are described and illustrated in this the fourth of a series that includes those not identified when compared with any of the previously known species.

**Keywords:** Colombia, Orchidaceae, Pleurothallidinae, *Stelis*

While continuing to revise the genus *Stelis* Sw. (Orchidaceae) for Colombia, an additional 50 new species are described and illustrated in the fourth part of this series.

***Stelis alboviolacea*** Luer, *sp. nov.* TYPE: COLOMBIA. Chocó: San José del Palmar, Cerro Torrá, mesa below the summit, 2500 m, 17 August 1988, P.A. Silverstone-Sopkin 4532 (Holotype: MO; Isotype: CUV), C. Luer illustr. 21983. Fig. 1.

This species is characterized by a stout, long-repent rhizome; erect ramicauls with acute, elliptical leaves surpassed by a second raceme of flowers with a dark purple dorsal sepal and a white synsepal.

*Plant* medium to large, epiphytic, long-repent, the rhizome stout, 4–10 cm long between ramicauls; roots slender. Ramicauls stout, erect, 3–6 cm long, enclosed by tubular, evanescent sheaths. *Leaf* erect, coriaceous, elliptical, acute, petiolate, 4–6.5 cm long, 1–1.5 cm wide in dry state, contracted below into a slender petiole ca. 1.5 cm long. *Inflorescence* single; to 17 cm long, the raceme erect, congested, strict, secund, many-flowered with most flowers open simultaneously; floral bracts purple, oblique, acute, 3 mm long; pedicels 1.5 mm long; ovary 1.5 mm long; peduncle 1.5–2 cm long, subtended by a spathe within the sheath, from a node below the apex of the ramicaul; flowers bicolored; *sepals* glabrous, the dorsal sepal red-violate, antrorse, elliptical, obtuse, concave, 5–6 mm long, 2.5 mm wide, 3-veined, connate basally, the lateral sepals white, connate into an obtuse, ovoid synsepal, 4–4.5 mm long, 4–5 mm wide unexpanded; *petals* transversely oblong, 0.5 mm long, 0.75 mm wide, 3-veined, the apex broadly rounded with a thickened margin, concave; *lip* trilobed, ca. 0.5 mm long, 0.6 mm wide, 0.5 mm deep, the lateral lobes rounded, the apical lobe thick and rounded, the dorsum thickened with a low, central callus, the base truncate, hinged to the base of the column; *column* semiterete, ca. 0.5 mm wide and long, the anther and the bilobed stigma apical.

**Etymology:** From the Latin *alboviolaceus*, “white-violet,” referring to the colors of the sepals.

This long-repent, distinct species of section *Humboldtia* is characterized by a red-purple dorsal sepal that is longer than a white, ovoid synsepal over which it hovers. Unfortunately,

the flowers do not rehydrate well, leaving details of the minute central apparatus poorly visualized. The petals are concave and three-veined with the thickened, rounded margin. The minute lip is apparently transversely bilobed with the lateral lobes rounded and larger than the middle lobe.

***Stelis aleanophila*** Luer, *sp. nov.* TYPE: COLOMBIA. Putumayo: Mocoa, Río Mocoa. 700–900 m, collected by J.M. Serna, 26 August 1977, fl. in cult. by the Robledos, 21 November 1981, C. Luer 6739 (Holotype: SEL). Fig. 2.

This medium-sized, densely caespitose species is characterized by acute, narrowly elliptical leaves exceeded by a single raceme; acute, ovate, glabrous three-veined sepals with the lateral sepals antrorse; single-veined, cuneate petals; and a subquadrate lip with an apiculate, truncate apex.

*Plant* medium in size, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 4–5 cm long, enclosed by a close, tubular sheath from below the middle and 2 other sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 6–8 cm long, including a petiole 1.5–2 cm long, the blade thick, 0.8–1 cm wide in the dry state, narrowly cuneate below into the petiole. *Inflorescence* solitary; 10–14 cm tall, the raceme erect, strict, congested, distichous, many-flowered, with many flowers open simultaneously; floral bracts oblique, acute, 2 mm long; pedicels 1.5 mm long; ovary 1 mm long; the peduncle 2–3 cm long, with a slender spathe ca. 1 cm long, from a node near the apex of the ramicaul; flowers light yellow; *sepals* glabrous, ovate, subacute, connate to near the base, 3-veined, the dorsal sepal 2.3 mm long, 1.5 mm wide, the lateral sepals parallel, 2.5 mm long, 1.5 mm wide; *petals* thin, broadly cuneate, the truncate apex minimally thickened, 0.5 mm long, 0.8 mm wide, 1-veined; *lip* subquadrate, 0.6 mm long, 0.6 mm wide, 0.5 mm deep, concave below a thick, bigibbous, shallowly cleft bar, the apex truncate, with a short, triangular apiculum, the dorsum slightly convex, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.5 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Greek *aleanophilus*, “lover of warm places,” referring to the lowland habitat.

The author is grateful to the staff of MO and SEL for making their specimens available for study, to S. Dalström for inking the figures presented herein, all based on pencil drawings by the author, and to the generosity of the Pleurothallid Alliance for making the inking possible. Adam Karremans reviewed an early version of the text and Antonio Toscano de Brito scrutinized the proofs.

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This species from lowland, southeastern Colombia is characterized by densely caespitose, slender ramicauls that bear narrow, elliptical leaves that are exceeded by a many-flowered raceme of small flowers. The sepals are ovate, subacute and three-veined, with the laterals antrorse, mimicking a synsepal. The petals are cuneate and single-veined. The lip is subquadrate with a thick, notched bar, and a truncate apex with a small, triangular apiculum.

**Stelis amilotensis** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Tolima: Alto de Pozo, W of Ibagué, 3000 m, 20 April 1982, C. Luer, J. Luer & R. Escobar 7479 (Holotype: SEL). Fig. 3.

This large, caespitose species is characterized by slender ramicauls; elliptical leaves with one or two many-flowered inflorescences more or less equally long; broadly ovate, glabrous sepals with the dorsal sepal five-veined; thick, three-veined petals; and a broad, shallow lip with a round, dorsal callus.

*Plant* large, epiphytic, caespitose; roots slender. Ramicauls erect, slender, 5–14 cm long, with a tubular sheath above the middle, and another 2 sheaths below the middle and about the base. *Leaf* erect, coriaceous, elliptical, acute, petiolate, 7–11 cm long including the petiole 1.5–2 cm long, the blade 2–2.8 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 7–11 cm long, the racemes erect, distichous, congested, many-flowered, floral bracts oblique, acute, 4 mm long; pedicels 3 mm long; ovary 1.25 mm long; the peduncle ca. 2 cm long, with a spathe ca. 6 mm long below the apex of the ramicaul; flowers yellow; *sepals* glabrous, expanded, broadly ovate, obtuse, connate below the middle, the dorsal sepal 5 mm long, 6 mm wide, 5-veined, the lateral sepals oblique, 4 mm long, 4.5 mm wide, 4-veined; *petals* transversely elliptical, concave, the apex broadly rounded with a thick margin, and with a transverse carina, 1 mm long, 1.8 mm wide, 3-veined; *lip* subquadrate, 0.8 mm long, 1.6 mm wide, 0.8 mm deep, shallowly concave below a thick, shallowly cleft bar, the apex broadly rounded, the margin narrowly thickened, the dorsum with a rounded callus between the cleft and the truncate base; *column* clavate, ca 1.5 mm wide, 1 mm long, the anther and the stigmatic lobes apical.

**Eponymy:** Named for Tolima (with backward spelling) where the species is found.

This large, caespitose species is distinguished by a combination of morphological features that are not unusual: slender ramicauls, elliptical leaves, and one or two inflorescences that equal or shortly exceed the leaves; broad, obtuse, glabrous sepals with the dorsal sepal five-veined; thick, three-veined petals; and a wide but shallow, type A lip with a round, dorsal callus between a thick, shallowly cleft bar and the base. This combination of morphological features sets *Stelis amilotensis* apart from all others.

**Stelis bialaria** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Norte de Santander: Alto de Santa Inez, 2150 mm, 13 May 1984, C. Luer, J. Luer & R. Escobar 10351 (Holotype: MO). Fig. 4.

This small, ascending-caespitose species is distinguished by long-petiolate leaves borne by shorter ramicauls with loose, tubular sheaths; a longer, successively several-flowered raceme; broad, nearly subcircular sepals; ovate, obliquely inserted, single-veined petals; and an obtuse lip with a small, suborbicular callus on the dorsum.

*Plant* small, epiphytic, densely ascending-caespitose; roots slender. Ramicauls erect, slender, 5–10 mm long, enclosed by a loose, tubular sheath from below the middle and another 1–2 sheaths below. *Leaf* erect, coriaceous, elliptical, subacute, petiolate, 2–3 cm long including the petiole ca. 1 mm long, the blade 3–4 mm wide in the dry state, cuneate below to the petiole. *Inflorescence* single; 2.5–3 cm long, the raceme erect, strict, successively several-flowered; floral bracts acute, oblique, 1.5 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle ca. 1.5 cm long, from a node at the apex of the ramicaul; *sepals* glabrous, the transversely ovate or subcircular, broadly obtuse, connate to near the middle, 3-veined, the dorsal sepal light green, 1.8 mm long, 1.8 mm wide, the lateral sepals light purple, 1.3 mm long, 1.3 mm wide; *petals* obliquely positioned, purple, ovate, concave, 1 mm long, 1 mm wide, 1-veined, the apex obtuse, with the margin thickened, with crystalline deposits; *lip* purple, type-A, thick, subquadrate, 0.5 mm long, 0.6 mm wide, 0.5 mm deep, shallowly concave below the bar, shallowly cleft, the apex rounded with a thickened margin, the dorsum slightly concave, with a small, orbicular callus, the base truncate, hinged to the base of the column; *column* small, ca. 0.3 mm long and wide, the anther and the bilobed stigma apical.

**Etymology:** From the Latin *bialarius*, “with two wings,” referring to the petals.

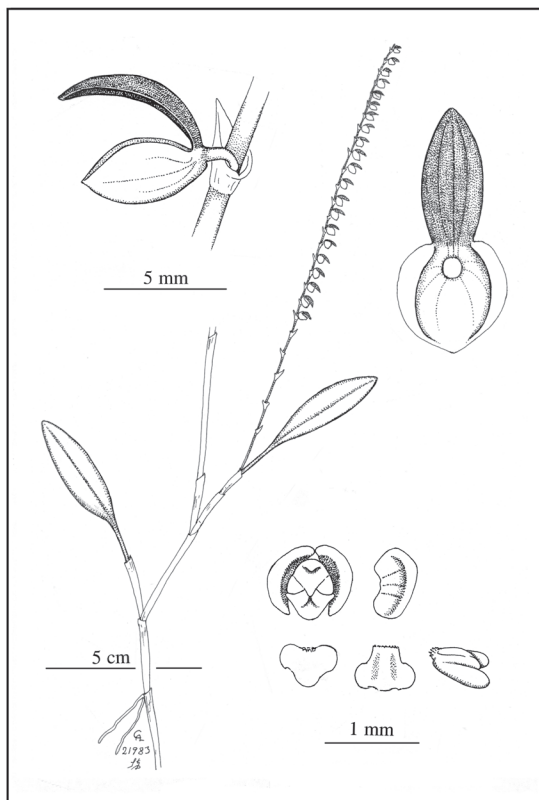
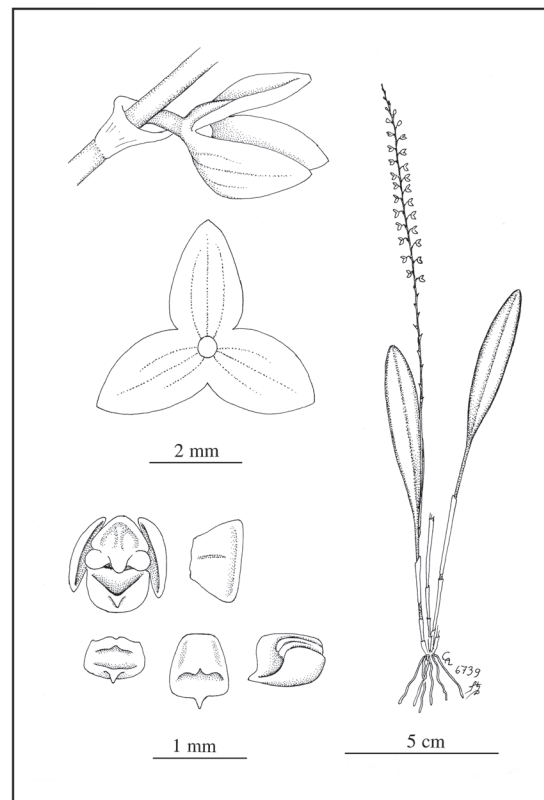
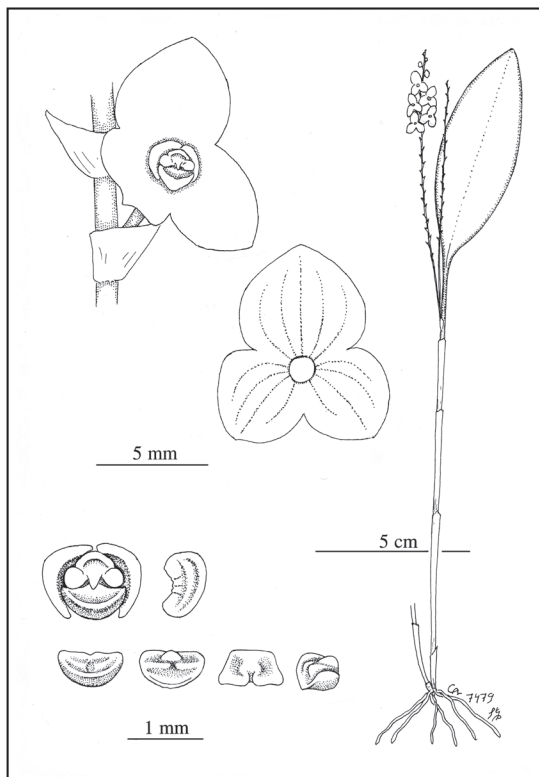
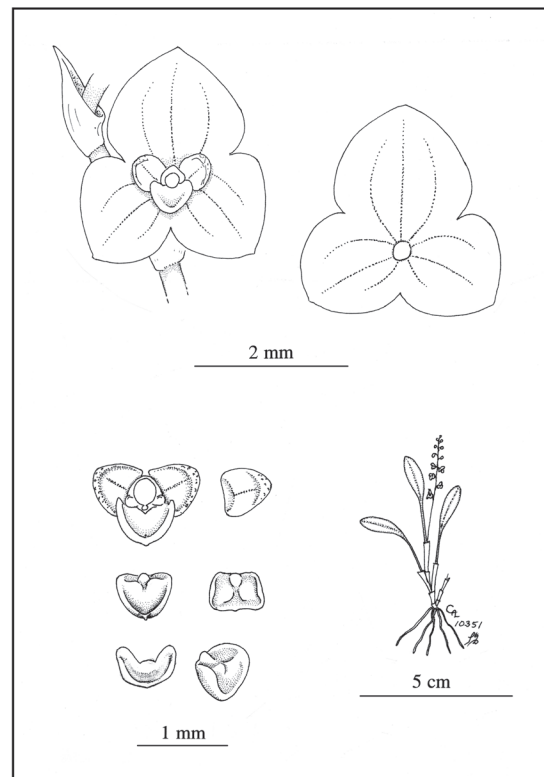
This very small, caespitose species is distinguished by elliptical, petiolate leaves only slightly exceeded by a strict, successively several-flowered raceme. The broadly obtuse sepals appear subcircular, the dorsal sepal, light green, and the lateral sepals, light purple. The ovate, single-veined petals are inserted obliquely to appear as a pair of wings protruding from behind the column. The type A lip is distinguished by a small, orbicular callus on the dorsum.

**Stelis blandita** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: Bucaramanga, between Bucaramanga and Berlin, 3200 m, 27 April 1982, C. Luer, J. Luer & R. Escobar 7606 (Holotype: SEL). Fig. 5.

Except for the rather large golden yellow flowers, this caespitose species has no distinctly different vegetative character, but the lip with a thick, center that lifts the bar with a looped callus above the rounded margins differs from all the others.

*Plant* small or medium in size, epiphytic, densely caespitose. Ramicauls erect, 2–4 cm long, with a tubular sheath from near the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute to rounded at the tip, 3.5–5 cm long including a petiole ca. 0.5 cm long, the blade 0.8 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; 12–14 cm long, the raceme erect, strict, subclax, distichous; floral



FIGURE 1. *Stelis alboviolacea* LuerFIGURE 2. *Stelis aleanophila* LuerFIGURE 3. *Stelis amilotensis* Luer & R. EscobarFIGURE 4. *Stelis bialaria* Luer & R. Escobar

bract tubular, obtuse, 2 mm long, 2 mm wide; pedicels 2 mm long; ovary 1.5 mm long; the peduncle ca. 3 cm long, subtended by a spathe 5 mm long, from a node near the apex of the ramicaul; *sepals* golden yellow, glabrous, 3-veined, the dorsal sepal ovate, obtuse, 4.5 mm long, 4 mm wide, the lateral sepals broadly ovate, subcircular, 3.5 mm long, 4 mm wide, connate near the middle; *petals* green, transversely ovate, 1.5 mm long, 2 mm wide, 3-veined, convex below the rounded apex with a narrowly thickened margin, without a transverse carina; *lip* green with purple edge, subquadrate, 1.5 mm long, 1.5 mm wide, 1 mm deep, concave below a thickened center that elevates a shallowly cleft bar above the level of the rounded sides, the cleft being delimited by a thickened, loop-like margin, the apex of the lip rounded with a thickened margin, the dorsum slightly descending, featureless, the base truncate, connate to the base of the column; *column* stout, ca. 1.5 mm long and wide, the anther and the stigmatic lobes apical.

**Eponymy:** From the Latin *blanditus*, "charming," referring to the pretty inflorescence.

This small or medium-sized, caespitose species is pretty with rather large, golden yellow flowers, but otherwise not remarkable except for the lip. The lip is thick centrally, rising above the rounded sides and a rounded bar with a glenion appearing like a margined, loop-like depression.

**Stelis chasmiphora** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Putumayo: between Sibundoy and Mocoa, near Km. 88, 2200 m, 20 January 1979, C. Luer, J. Luer & O. Ospina 3720 (Holotype: SEL). Fig. 6.

This medium-sized, caespitose species is characterized by an elliptical-oblong leaf slightly surpassed by a distichous raceme of small flowers with short-pubescent sepals; thick, 3-veined petals; and a subquadrate lip deeply concave between separated halves of a divided bar.

**Plant** medium-sized, epiphytic, densely caespitose. Ramicauls erect, slender, 4–7 cm long, with a tubular sheath from below the middle, and another 2 sheaths below and at the base. **Leaf** erect, coriaceous, oblong-elliptical, obtuse, 6–7 cm long including a petiole 1.5–2 cm long, the blade 1–1.4 cm wide in the dry state, cuneate below to the petiole. **Inflorescence** solitary; 6–7 cm long, the raceme erect, distichous, many-flowered; floral bracts oblique, acute, 2–2.5 mm long; pedicels 1–1.5 mm long; ovary 1 mm long; the peduncle ca. 1.5 mm long, subtended by a slender spathe 1 cm long, from a node below the apex of the ramicaul; flowers pale yellow; *sepals* shortly pubescent, ovate, obtuse, three-veined, connate below the middle, the dorsal sepal 3 mm long, 2.75 mm wide, the lateral sepals oblique, 2.3 mm long, 2 mm wide; *petals* transversely ovate, concave, 0.75 mm long, 1 mm wide, 3-veined, the apex rounded, thick; *lip* subquadrate, 1 mm long, 1 mm wide, 0.75 deep, deeply concave below a widely divided bar with a rounded callus interposed, the tip obtusely angled and slightly incurved, the dorsum with a space before the round, basal callus flanked by the halves of the bar, the base broadly truncate, pubescent, hinged to the base of the column; *column* stout, ca. 1.2 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Greek *chasmiphor*, "bearing a chasm," referring to the cavity between the halves of the bar.

This caespitose species is characterized by a small-flowered, distichous raceme that slightly exceeds the leaf. The sepals are short-pubescent and the petals are thick and three-veined. The lip is a variation the type A with the halves of the bar widely and deeply separated with a rounded callus from the base interposed.

**Stelis chiliantha** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: forest between Santa Barbara and Guaca, 2400 m, 6 November 1981, C. Luer & R. Escobar 6599 (Holotype: SEL). Fig. 7.

This medium-sized, caespitose species is characterized by a few inflorescences longer than narrow leaves, faintly veined dorsal sepals, single-veined lateral sepals and petals, and a minute lip shallowly concave below an indistinctly bigibbous bar.

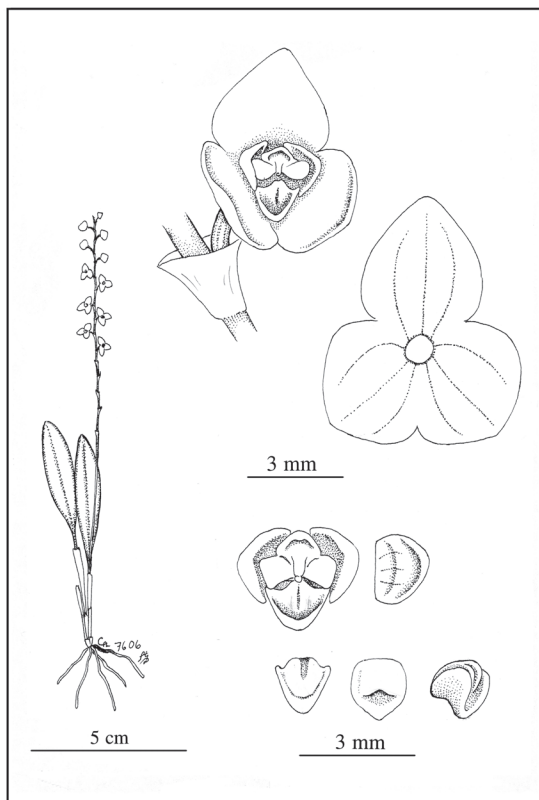
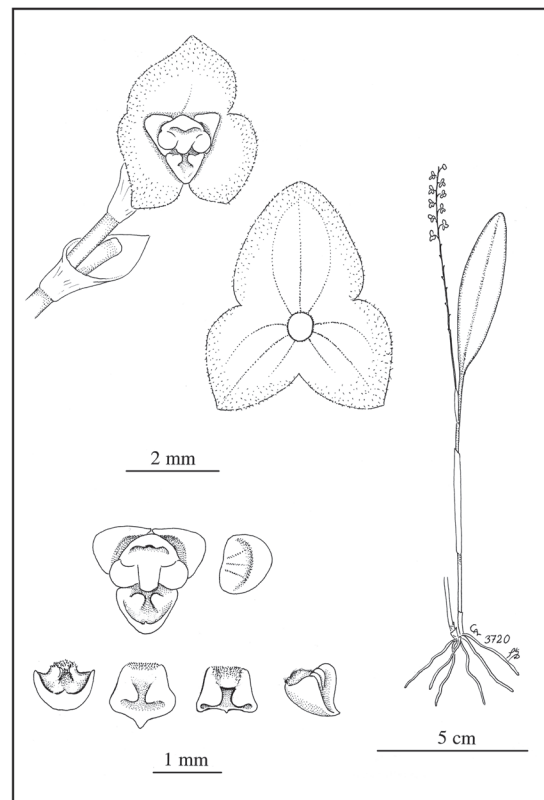
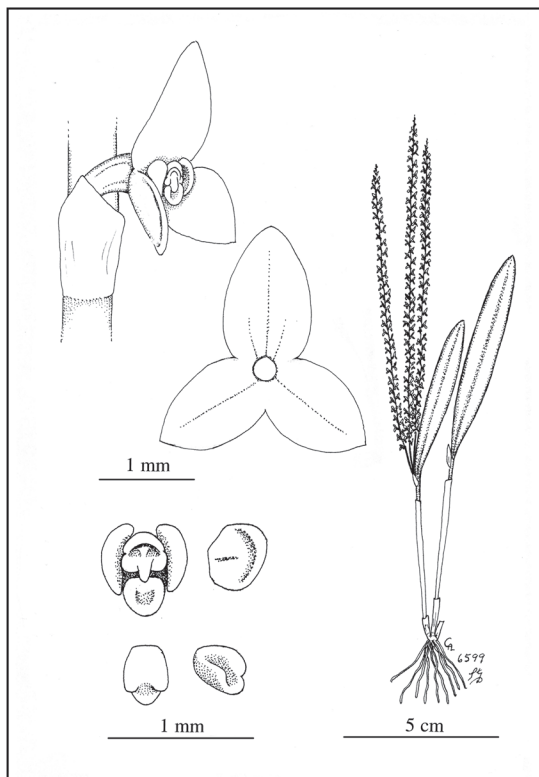
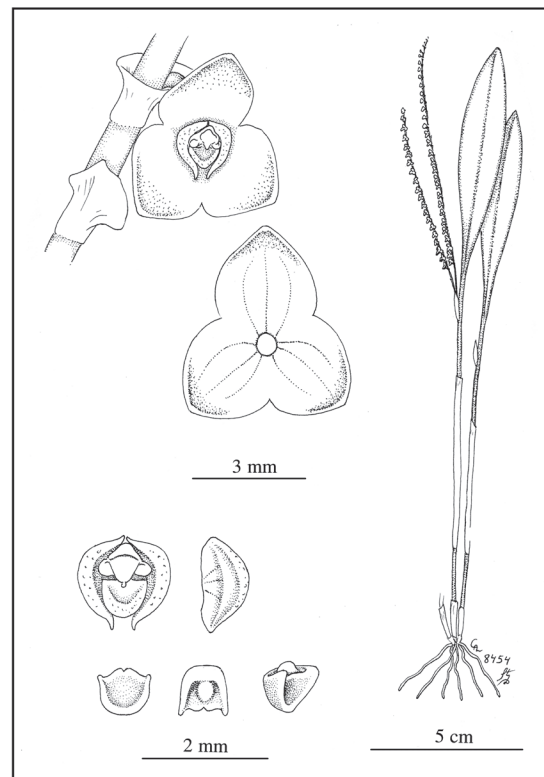
**Plant** medium in size, epiphytic, densely caespitose. Ramicauls erect, slender, 4–6 cm long, with a tubular sheath from below the middle, and another 1–2 tubular sheaths below at the base. **Leaf** erect, coriaceous, elliptical-oblong, subacute, 6–8 cm long including a petiole less than 1 cm long, the blade 0.8–1 cm wide in the dry state, cuneate below to the petiole. **Inflorescence** 2–3 simultaneous; 11–14 cm long, the racemes erect, congested, distichous, many-flowered; floral bracts oblique, subacute, 1.5 mm long; pedicels 1 mm long; ovary 0.6 mm long; the peduncle 1–1.5 cm long, subtended by a spathe 6–10 mm long, from a node below the apex of the ramicaul; flowers yellow-white; *sepals* glabrous, fleshy, not widely expanded, ovate, subacute, connate basally, the dorsal sepal 1.5 mm long, 1 mm wide, faintly 3-veined, the lateral sepals 1.3 mm long, 0.8 mm wide, 1-veined; *petals* transversely ovate, 0.5 mm long, 0.6 mm wide, 1-veined, shallowly concave below a slightly thickened, rounded apex; *lip* subquadrate, 0.5 mm long, 0.4 mm wide, 0.3 mm deep, concave below a faintly bigibbous bar, the apex rounded, the base rounded, hinged to the base of the column; *column* stout, ca. 0.5 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Greek *chilianthos*, "thousand-flowered," referring to the numerous, minute flowers produced simultaneously.

This medium-sized, caespitose species is distinguished by two or three densely and minutely many-flowered racemes longer than narrow, elliptical-oblong leaves. The sepals are fleshy ovate, subacute with the lateral sepals single-veined; the petals are subcircular and also single veined. The lip is minute, obtuse and shallowly concave below a faintly bigibbous bar.

**Stelis coccidifera** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Cauca: between Paispamba and Chapa, 2500 m, 16 November 1982, C. Luer, J. Luer & R. Escobar 8454 (Holotype: SEL). Fig. 8.

This slender, caespitose species is characterized by acute, elliptical, petiolate leaves and two or three strict

FIGURE 5. *Stelis blandita* Luer & R.EscobarFIGURE 6. *Stelis chasmiflora* Luer & R.EscobarFIGURE 7. *Stelis chiliantha* Luer & R.EscobarFIGURE 8. *Stelis coccidifera* Luer & R.Escobar

racemes about equally long with ovate, three-veined sepals; thick, broad, three-veined petals; and a smaller lip with a suborbicular callus on the descending dorsum.

*Plant* medium or large, epiphytic, densely caespitose. Ramicauls erect, slender, 7–11 cm long, with a tubular sheath from below the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 8–10 cm long including a slender petiole 1–2 cm long, the blade 1.2–1.5 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 2–3; 8–11 cm long, the racemes erect, strict, congested, secund, many-flowered with many flowers open simultaneously, floral bracts oblique, dilated, obtuse, 2 mm long, 2 mm wide; pedicels 1.5 mm long; ovary 1 mm long; the peduncle ca. 1 cm long, subtended by a spathe 10 mm long, from a node near the apex of the ramicaul; flowers dark purple; *sepals* sparsely microscopically pubescent, broadly ovate, obtuse, 1.5 mm long, 1.5 mm wide, 3-veined, connate below the middle; *petals* transversely semilunate, 0.75 mm long, 1.7 mm wide, 3-veined below a transverse carina, the apical margin rounded and thickened; *lip* subquadrate, 0.6 mm long, 0.75 mm wide, 0.75 mm deep, shallowly concave below the bar, the apex rounded with a slightly thickened margin, the dorsum descending with a central, suborbicular callus, the base truncate, connate to the base of the column; *column* stout, ca. 0.75 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *coccidifer*, “bearing a berry,” referring to the suborbicular callus on the dorsum of the lip.

This slender, caespitose species is distinguished by elliptical leaves accompanied by two or three, congested, more or less secund racemes of small dark purple flowers. The sepals are broadly ovate and three-veined, and the petals are transversely semilunate, thick and about as wide as a sepal. The smaller lip is a modified type A with a suborbicular callus on a sloping dorsum.

***Stelis conchipetala*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Norte de Santander, Páramo de Jurisdicciones, 2600 m, collected 10 November 1981, fl. in cult. at Selby Gardens 81-2665, 16 February 1982, C. Luer 6838 (Holotype: SEL). Fig. 9.

This medium-sized, caespitose species is characterized by a loosely flowered raceme longer than obtuse, elliptical leaves; long-pubescent, subacute, three-veined sepals; concave, semilunate, three-veined petals; and a thick, subcircular lip with the dorsum deflexed nearly the length of the lip.

*Plant* medium-sized, epiphytic, caespitose; roots slender. Ramicauls erect, slender, 2–3.5 cm long, with a tubular sheath from below the middle, and another sheath below at the base. *Leaf* erect, coriaceous, elliptical, obtuse to rounded at the tip, 6–9 cm long including a petiole 2–3 cm long, the blade 1.5–2 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; 12–15 cm long, the raceme suberect, flexible, subflexuous, distichous, loose; floral bracts oblique, acute, 4 mm long; pedicels 2 mm long; ovary 2 mm long; the peduncle 2–4 cm long, subtended by a slender spathe ca. 5 mm long, from a node below the

apex of the ramicaul; *sepals* expanded, dull purple with a long, fine, white pubescence, elliptical-ovate, obtuse, three-veined, free to near the base, the dorsal sepal 5 mm long, 4 mm wide, the lateral sepals 4 mm long, 3.5 mm wide; *petals* transversely semilunate, 1.2 mm long, 2.3 mm wide, 3-veined, concave within the rounded apex with a distinct, narrow margin, without a transverse carina; *lip* subcircular, thick, 2 mm long, 1.5 mm wide, 1.8 mm deep, shallowly concave and smooth below the bar, the apex rounded with a narrow margin, the dorsum deflexed from the bar and descending nearly the length of the lip, hinged to the base of the column; *column* clavate, 2 mm long, 1.6 mm wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *conchipetalus*, “with shell-like petals,” referring to the bivalvate shape of the large petals.

This medium-sized, caespitose species is distinguished by rather large flowers in a loose, subflexuous raceme longer than the leaf. The leaves are obtuse to nearly rounded at the tip; the sepals are subacute with a long, fine pubescence; and the large petals are semilunate and concave with a narrow margin. The lip is thick with the dorsum deflexed from the transverse bar and extending nearly the length of the lip.

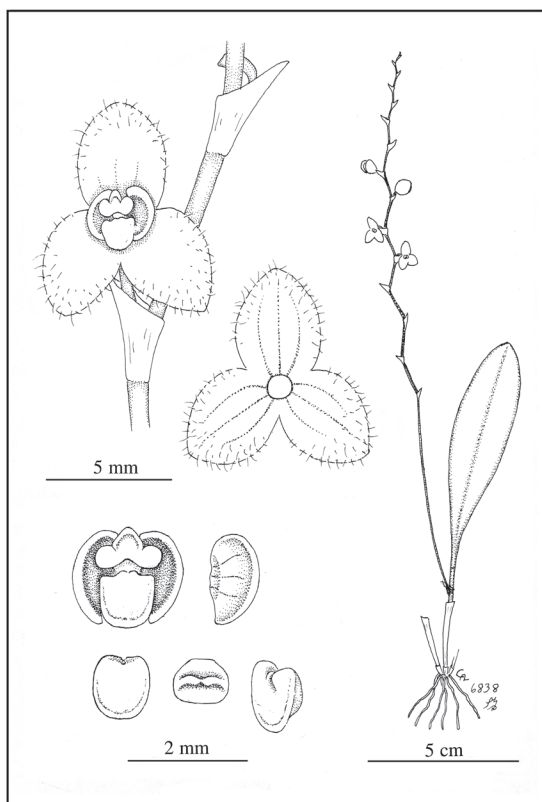
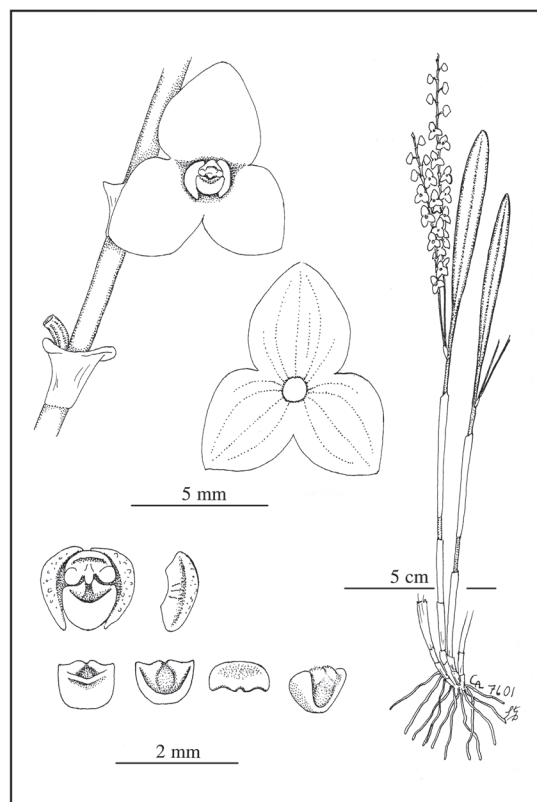
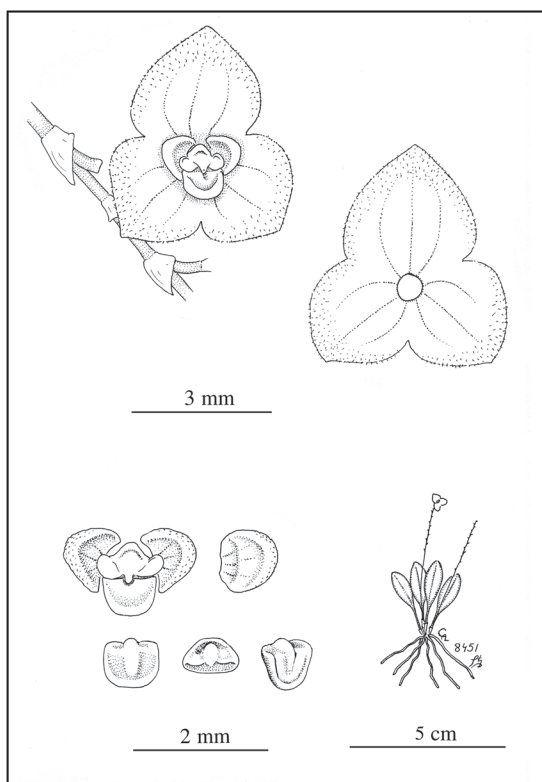
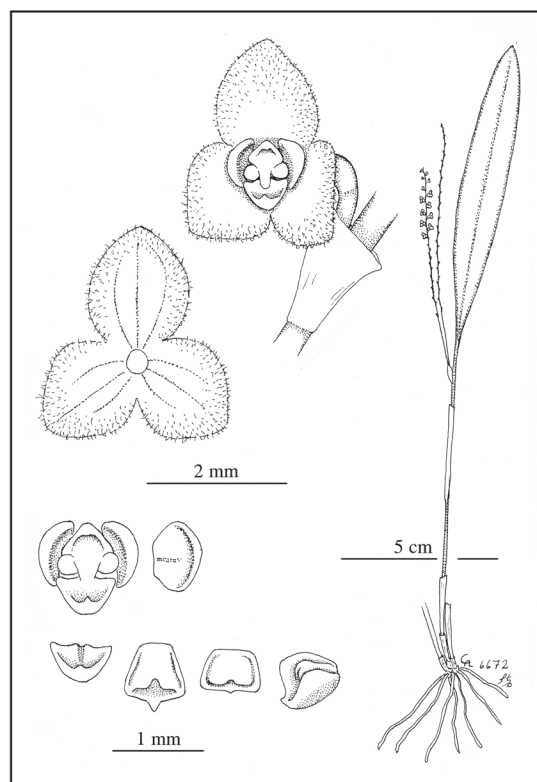
***Stelis culmosa*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: Bucaramanga, between Bucaramanga and Berlin, 2800 m, 27 April 1982, C. Luer, J. Luer & R. Escobar 7601 (Holotype: SEL). Fig. 10.

This species is characterized by great bundles of slender ramicauls with narrowly elliptical leaves; two or three racemes; glabrous sepals with the dorsal sepal five-veined; and a lip with a suborbicular callus below the bar on the anterior surface.

*Plant* medium to large, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, 7–11 cm long, with a tubular sheath from near the middle and another 2 sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 5–8 cm long including a petiole 1–1.5 cm long, the blade 0.4–0.6 cm wide in the dry state, narrowed below into the petiole. *Inflorescence* 2–3, 8–12 cm long, the racemes erect, distichous, mostly simultaneously many-flowered, the peduncle 2–3 cm long, from a node below the abscission layer; floral bracts dilated, obtuse, 3–4 mm long, 2 mm wide; pedicels 3 mm long; ovary 2 mm long; *sepals* color notes lost, expanded, minutely short-pubescent, ovate, obtuse, 3-veined, connate below the middle, the dorsal sepal 4.5 mm wide, 4 mm wide, the lateral sepals 4 mm long, 3.75 mm wide; *petals* transversely ovate, concave, the broadly obtuse apex thickened, 0.75 mm long, 1.25 mm wide, 3-veined; *lip* subquadrate, 1 mm wide, 0.75 mm long, 0.5 mm deep, narrowly concave within the rounded apex, the bar elevated, shallowly channeled, with a hemispherical callus on the anterior surface, the dorsum descending, featureless, hinged to the base of the column; *column* clavate, ca. 1 mm wide and long, the anther and stigmatic lobes apical.

**Etymology:** From the Greek *culmosus*, “full of stems,” referring to the masses of clustered ramicauls.

This densely caespitose species is characterized by two or three many-flowered racemes that surpass narrowly

FIGURE 9. *Stelis conchipetala* Luer & R.EscobarFIGURE 10. *Stelis culmosa* Luer & R.EscobarFIGURE 11. *Stelis cupidinea* Luer & R.EscobarFIGURE 12. *Stelis dejavu* Luer & R.Escobar



elliptical leaves borne by slender ramicauls. The sepals are ovate and glabrous, and the petals are three-veined. On the anterior surface of the lip is a central, suborbicular callus similar to that of *Stelis trochophora* Luer & R. Escobar, but *Stelis culmosa* is distinguished best by large clusters of narrowly elliptical leaves, and four- to five-veined, glabrous sepals.

**Stelis cupidinea** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Cauca: Páramo de Moras, cultivated in Popayán by Amalia Lehmann de Sarria, 16 November 1982, *C. Luer* 8451 (Holotype: SEL). Fig. 11.

This very small, caespitose species is characterized by many-flowered, flexuous raceme that exceeds an elliptical leaf twice its length; broadly ovate, obtuse sepals; thick, three-veined petals; and a lip with a dorsal callus that extends forward onto the flat, non-concave, anterior surface.

*Plant* very small, epiphytic, caespitose; roots slender. Ramicauls erect, 5 mm long, enclosed by 2 tubular sheaths. *Leaf* erect, coriaceous, elliptical, subacute to obtuse, 10–15 mm long including a petiole 2–3 mm long, the blade 4–5.5 mm wide when dry, cuneate below into the petiole. *Inflorescence* single; 20–35 mm long, erect, distichous, flexuous, many flowered; floral bracts oblique, acute, 1 mm long; pedicel 1 mm long; ovary 1 mm long; the peduncle ca. 12 mm long, from near the apex of the ramicaul; flowers purple; *sepals* minutely pubescent, broadly ovate, obtuse, connate below the middle, 3-veined, the dorsal sepal 3 mm long, 3 mm wide, the lateral sepals 2 mm long, 2.5 mm wide; *petals* subcircular, 1 mm long, 1 mm wide, thick, broadly rounded at the apex, shallowly concave below the thickened, apical margin, concave and 3-veined below the transverse carina; *lip* subquadrate, 0.6 long, 0.75 mm wide, 0.4 mm deep, the anterior surface flat below the bar, apex rounded and thickened, the dorsum shallow, with a central, rounded callus that extends forward over the bar onto the anterior surface, the base truncate, hinged to the base of the column; *column* stout, ca. 0.5 mm long, 0.8 mm wide across the stigmatic lobes, the anther and stigmatic lobes apical.

**Etymology:** From the Latin *cupidineus*, pertaining to Cupid, something “dainty,” referring to the tiny habit.

This very small species from the southern Central Cordillera is characterized by an elliptical leaf that is exceeded by twice the length by minute, flexuous, many-flowered racemes. Unfortunately, only two good flowers remained on Amalia’s plant, so it is unknown if it is simultaneously or successively flowered. The sepals are minutely pubescent and three-veined; the petals are broadly rounded at the apex, shallowly concave, but sharply concave and three-veined below a thick transverse carina. The lip is flat below the bar, except for a rounded callus that begins at the base of the shallow dorsum, and extends forward over the bar onto the anterior surface.

**Stelis dejavu** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Norte de Santander: terrestrial on road embankment near the pass between Abrego and Sardinata, 2500 m, 12 November 1981, *C. Luer*, *J. Luer* & *R. Escobar* 6672 (Holotype: SEL). Fig. 12.

This caespitose species is distinguished by one or two congested racemes that approach the leaf in length; shortly pubescent, obtuse, three-veined sepals; thin, single-veined petals; and a lip similar to that of *Stelis oblonga* (Ruiz & Pav.) Willd. with a shortly acuminate tip.

*Plant* medium in size, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 8–19 cm long, with a tubular sheath above the middle, and another 1–2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, narrowly obtuse, 9–11 cm long including a petiole 1.5–2 cm long, the blade 1.2–1.5 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 2; 7–9 cm long, the raceme erect, strict, congested, distichous, many-flowered with most flowers open simultaneously, floral bracts oblique, acute, 2 mm long; pedicels 1.5 mm long; ovary 1 mm long; the peduncle ca. 1.5 cm long, subtended by a slender spathe 1 cm long, from a node near the apex of the ramicaul; flowers yellow; *sepals* shortly pubescent, expanded, ovate, obtuse, 3-veined, connate basally, the dorsal sepal 1.8 mm long, 1.6 mm wide, the lateral sepals 1.5 mm long, 1.6 mm wide; *petals* thin, transversely elliptical, concave below a rounded apex with a narrowly thickened margin, 0.6 mm long, 0.8 wide, 1-veined; *lip* type A, subquadrate, 0.7 long, 0.7 mm wide, 0.5 mm deep, concave below a cleft bar cleft with a deep glenion, the apex truncate with a short, acute, triangular apiculum, the dorsum smooth, slightly convex, the base truncate, attached to the base of the column; *column* stout, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** Named for the commonly used French expression “deja vu,” that recalls an illusion that it has been seen before.

This caespitose species with a couple of small-flowered racemes slightly shorter than a narrowly elliptical leaf, produces flowers reminiscent of *Stelis oblonga* (Ruiz & Pav.) Willd. The flowers with shortly pubescent, obtuse sepals, and the lip with a cleft bar and apiculate tip are similar, but the petals are thin and single-veined, instead of thick and three-veined.

**Stelis desautelsii** Luer, *sp. nov.* TYPE: COLOMBIA. Valle de Cauca: between Valle de Mercedes and Ataca, 2000 m, collected by Paul Desautels, fl. in cult. at Colomborquídeas, 23 November 1981, *C. Luer* 6765 (Holotype: SEL). Fig. 13.

This large, caespitose species is distinguished by a congested raceme that exceeds the elliptical leaf; floral bracts closely hugging the rachis; broadly ovate, three-veined, pubescent sepals; three-veined petals; and an ovoid lip with a callus descending from the bar.

*Plant* medium in size to large, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 8–10 cm long, with a tubular sheath on the middle third, another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 8–10 cm long including a petiole 1–1.5 cm long, the blade 1.5–1.7 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 15–20 cm long, the racemes erect, strict, congested, distichous, many-flowered, with 3 mm long floral bracts erect, obtuse, and enclosing the pedicels; pedicels 2.5 mm long; ovary 1 mm

long; the peduncle ca. 5 cm long, subtended by a spathe ca. 1.5 cm long, from a node near the apex of the ramicaul; *sepals* yellow, pubescent, expanded, broadly ovate, obtuse, 3-veined, connate to near the middle, the dorsal sepal transversely ovate, 2 mm long, 3 mm wide, the lateral sepals oblique, 2 mm long, 2.3 mm wide; *petals* yellow, thick, transversely ovate, concave within a broadly rounded apex, 3-veined, 1 mm long, 1.3 mm wide; *lip* brown with yellow margins, ovoid, 1 mm long, 1.2 mm wide, 0.6 mm deep, concave within the rounded apex, the bar intact with a small callus descending from the center, the apex broadly obtuse with a small, triangular apiculum, the dorsum slightly convex, the base truncate, attached to the base of the column; *column* stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Eponymy:** Named for Paul Desautels (1920–1991), collector of this species.

This large, caespitose species is characterized by a congested raceme that exceeds an elliptical leaf. Erect, obtuse floral bracts embrace the rachis and enclose the pedicels. The sepals are broadly obtuse, three-veined and pubescent, and the petals thick and three-veined. The lip is concave below the bar, but instead of being smooth, notched, or cleft, a small callus descends toward the apical margin that has a short, obtuse apiculum.

**Stelis discors** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: above Ricaurte, 1950 m, 2 November 1979, C. Luer, J. Luer & A. Hirtz 4563 (Holotype: SEL). Fig. 14.

Plant large, caespitose with a long, many-flowered inflorescence with five-veined sepals that are seven centimeters long in the lower half, decreasing to three and a half centimeters in the upper half; thick, three-veined petals; and a lip with a shortly acuminate tip.

*Plant* large, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 12–18 cm long, with a loose, tubular sheath on the middle third, another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, ovate, subacute, 12–13 cm long including a petiole 1.5–2 cm long, the blade 2.7–3 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; to 28 cm long, the raceme erect, subcongested, distichous, many-flowered; floral bracts oblique, acute, 3–4 mm long; pedicels 3 mm long; ovary 3 mm long; the peduncle ca. 10 cm long, subtended by a slender spathe 1.5 cm long, from a node near the apex of the ramicaul; flowers yellow, suffused and speckled with brown; *sepals* glabrous, expanded, ovate, obtuse, 5-veined, connate in lower third, the dorsal sepal 7 mm long, 5.5 mm wide, decreasing to 3.5 mm long, 3 mm wide toward the tip, the lateral sepals 2.5 mm long and wide, decreasing to 3 mm wide and long above; *petals* thick, transversely semilunate, with a broad, rounded margin, concave below a transverse carina, 3-veined, 0.75 mm long, 1.25 mm wide; *lip* ovoid, 0.6 mm long, 0.6 mm wide, 0.5 mm deep, concave below an indistinct bar, the apex obtuse with a short, acuminate apex, the dorsum convex, the base truncate, attached to the base of the column; *column* stout, ca. 0.5 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *discors*, “discordant,” referring to the marked difference in the sizes of the flowers in the lower part of the raceme compared to those above.

This large, caespitose species is characterized by a long, many-flowered raceme with relatively large flowers in lower half, and flower parts with less than half the dimensions toward the tip. Smaller flowers toward the tip of a raceme are commonly seen, but this magnitude is unusual. The sepals are five-veined, and the thick petals are three-veined. The apex of the obtuse lip is short and acuminate.

**Stelis diprizo** Luer, *sp. nov.* TYPE: COLOMBIA. Valle del Cauca: El Cairo, Cerro del Inglés, Serranía de los Paraguas, 2400 m, 28 December 1986, P.A. Silverstone-Sopkin 2665 (Holotype: MO; Isotype: CUVC), C. Luer illustr. 21991. Fig. 15.

This caespitose species is distinguished by ovate, petiolate leaves; an inflorescence of up to four, congested racemes about as long as the leaf; and a lip with a thick, bigibbous bar.

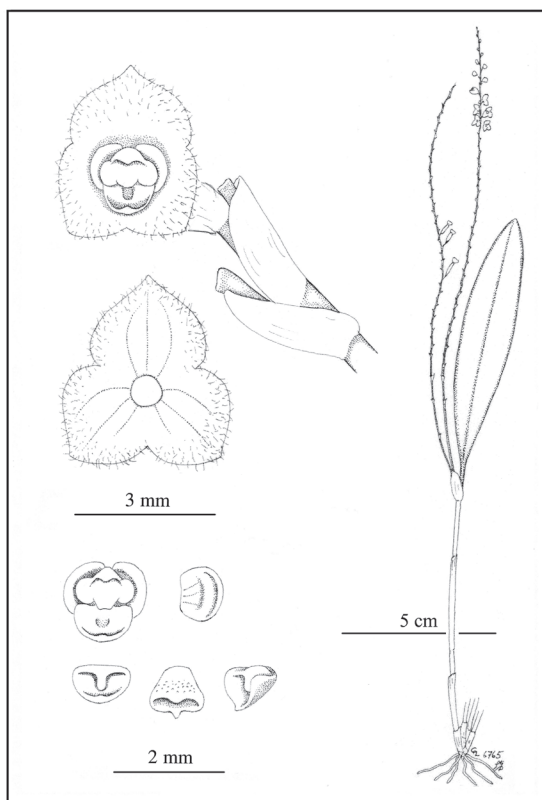
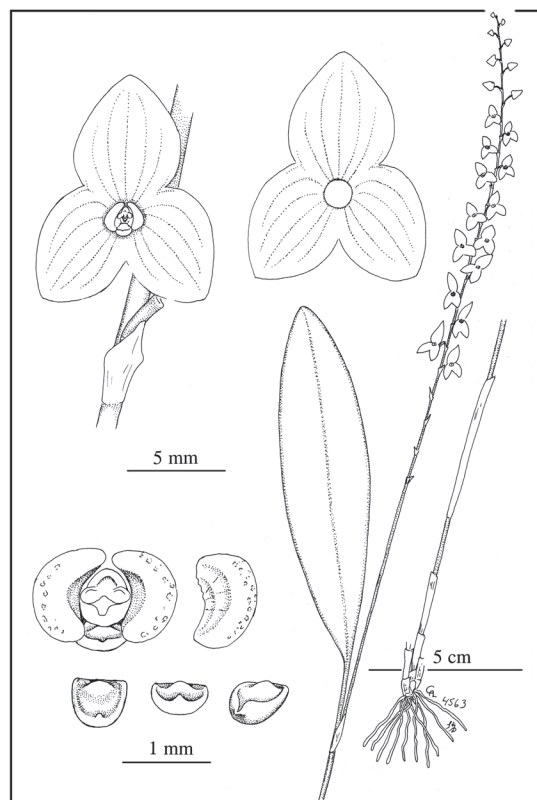
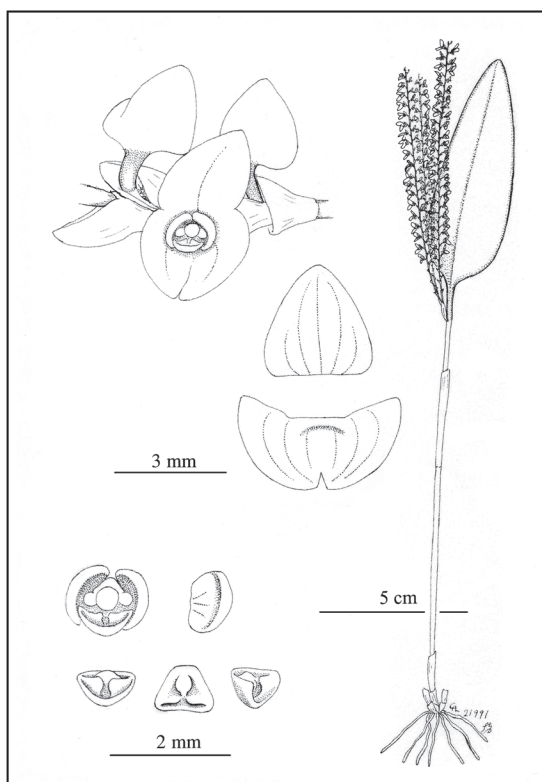
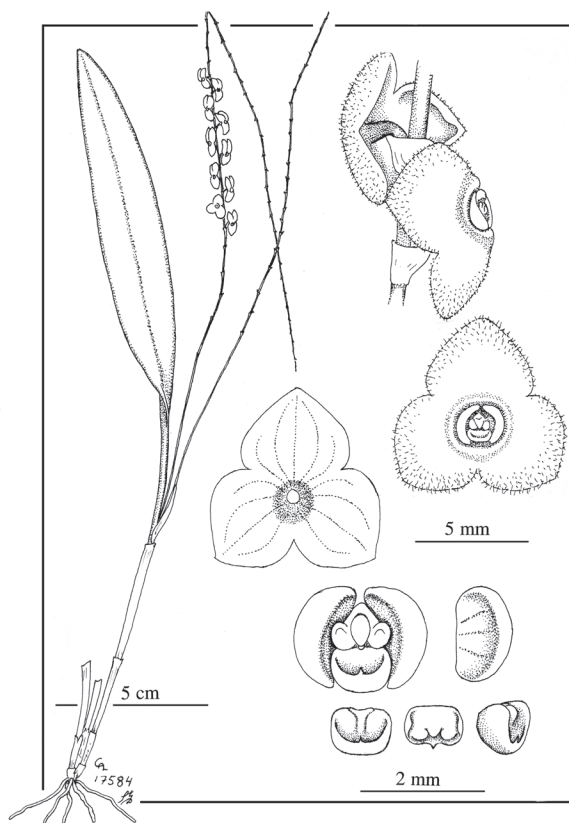
*Plant* large, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, 10–15 cm long, with a tubular sheath above the middle and another below and at the base. *Leaf* erect, coriaceous, ovate, acute, 9–11 cm long including a petiole ca. 1.5 cm long, the blade 2–2.8 cm wide in dry state, abruptly contracted below into the petiole. *Inflorescence* 1–4; 4–11 cm long, erect, strict, congested, distichous, many-flowered, flowering from near the base; floral bracts erect, oblique, acute, 3 mm long; pedicels ca. 2 mm long; ovary 1.5 mm long; the spathe ca. 8 mm long, from a node below the apex of the ramicaul; flowers dark red-violet; *sepals* glabrous, the dorsal sepal ovate, subacute to obtuse, 3.5 mm long, 3.5 mm wide, 5-veined, the lateral sepals connate into a shallowly concave synsepal, each sepal 3 mm long, 3 mm wide, 3-veined; *petals* transversely ovate, concave below the thickened, broadly rounded apical margin, 0.75 mm long, 1 mm wide, 3-veined, with a transverse carina; *lip* subquadrate, 0.75 mm long, 1 mm wide, 0.5 mm deep, concave below a thick, bigibbous bar with a deep glenion, the apex transversely obtuse, the dorsum with a low rounded callus, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.8 mm wide and long, anther and bilobed stigma apical.

**Etymology:** From the Greek *diprizo*, “double saw,” referring to the racemes of the inflorescence.

**Additional specimen examined:** COLOMBIA. Valle del Cauca: El Cairo, Cerro del Inglés, Serranía de los Paraguas, 2070–2430 m, 1 April 1988, P.A. Silverstone-Sopkin 3933 (MO, CUVC), C. Luer illustr. 21989.

This large, caespitose species of section *Humboldtia* is distinguished by an ovate, petiolate leaf, and a cluster of a few, congested; distichous racemes that resemble a double-bladed saw. The lip is distinctive with a thick, bigibbous bar with a deep glenion.

**Stelis dissidens** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Chocó: Guarumales, coll. by M. Zapata, fl. in cult. at Colomborquídeas, 23 May 1995, C. Luer 17584 (Holotype: MO). Fig. 16.

FIGURE 13. *Stelis desautelsii* LuerFIGURE 14. *Stelis discors* Luer & HirtzFIGURE 15. *Stelis diprizo* LuerFIGURE 16. *Stelis dissidens* Luer & R. Escobar



This large species is characterized by acute, elliptical-ovate, long-petiolate leaves; long racemes with convex, non-resupinate flowers; a five-veined dorsal sepal; and a lip with a round, concave, apiculate apex.

*Plant* large, epiphytic, densely caespitose. Ramicauls erect, relatively stout, 6–9 cm long, with a tubular sheath from near the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, acute, elliptical-ovate, 13–18 cm long including a conduplicate petiole 3–6 cm long, the blade 2–2.5 cm wide in the dry state, cuneate and conduplicate below into the petiole. *Inflorescence* 1–3; 17–27 cm long, the racemes erect, strict, subcongested, distichous, many-flowered with most flowers open simultaneously; floral bracts oblique, acute, 2.5 mm long; pedicels 2 mm long; ovary 1.5 mm long; the peduncle 6–10 cm long, subtended by a slender spathe 2 cm long, from a node below the apex of the ramicaul; flowers purple, non-resupinate; *sepals* pubescent, convex, broadly ovate, obtuse, connate to near the middle, the dorsal sepal 4 mm long, 5 mm wide, 5-veined, the lateral sepals 4 mm long, 5 mm wide, 4-veined; *petals* transversely ovate, 1 mm long, 1.5 mm wide, 3-veined, the apex broadly rounded, thickened, concave with an indistinct transverse carina; *lip* subquadrate, 0.75 mm long, 1 mm wide, 0.6 mm deep, concave below the bar that is overlaid with a callus from the dorsum, the apex concave, broadly rounded, with a minute apiculum, the dorsum with a broad, low callus, the base truncate, connate to the base of the column; *column* stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *dissidens*, “differing,” referring to unusual vegetative and floral morphology.

This large species is characterized by acute, elliptical-ovate leaves that are conduplicate below into a long petiole. The racemes are crowded with medium-sized, non-resupinate flowers with convex, pubescent sepals. The dorsal sepal is five-veined, the lateral sepals, four-veined. The apex of the lip is concave and broadly rounded with a minute apiculum.

***Stelis elementaria*** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Norte de Santander, forest near Agua de La Virgen, W of Ocaña, 1650 m, 4 May 1982, C. Luer, J. Luer & R. Escobar 7699 (Holotype: SEL). Fig. 17.

This small, caespitose species is characterized by a single, many-flowered raceme about twice longer than elliptical leaves; glabrous, obtuse, three-veined sepals; thin, subcircular, three-veined petals; and a simple, slightly convex lip with a rounded apex.

*Plant* small, epiphytic, caespitose; roots slender. Ramicauls erect, slender, 1–1.2 cm long, enclosed by a tubular sheath from below the middle, and another 1–2 sheaths at the base. *Leaf* erect, coriaceous, elliptical, subacute to obtuse, 2–2.5 cm long including a petiole 3–4 mm long, the blade 6–8 mm wide in the dry state, cuneate below to the petiole. *Inflorescence* single; 6–8 cm long, the raceme erect, many-flowered, distichous, congested; floral bracts oblique, obtuse, 1.25 mm long; pedicel 0.75 mm long; ovary 0.75 mm long; the peduncle 3–4 cm long, from a node near the apex of the ramicaul; flowers greenish white; *sepals* similar, glabrous, ovate, obtuse, 3-veined, 1.5

mm long and wide, connate below the middle; *petals* thin, subcircular, concave below a broad, indistinctly thickened margin, 3-veined; *lip* subquadrate, 0.8 mm long, 0.6 mm wide, 0.3 mm deep, shallowly concave below the bar, the apex rounded, the dorsum smooth, slightly convex, the base truncate, hinged to the column-foot; *column* stout, ca. 0.6 mm long and wide, the anther and stigmatic lobes apical.

**Etymology:** From the Latin *elementarius*, “elementary,” referring to the simple habit and flowers of a basic pattern.

None of the characters of this little, caespitose species is distinctive, all the features found commonly in other species: a single inflorescence with a peduncle as long as elliptical, subacute leaves; glabrous, obtuse, three-veined sepals; thin, subcircular, three-veined petals; and a simple, slightly convex lip with a rounded apex.

***Stelis fecunda*** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Antioquia: Frontino, below El Plateado, 1820 m, 3 May 1983, C. Luer, J. Luer & R. Escobar 9053 (Holotype: SEL). Fig. 18.

This small, caespitose species is similar to some variations of *Stelis pusilla* Kunth, but differs by a successively flowered raceme, larger flowers with subcircular sepals that are minutely pubescent toward the base, and a lip with a rounded, non-apiculate apex.

*Plant* small, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, 5–10 mm long, with a tubular sheath from near the base. *Leaf* erect, coriaceous, narrowly elliptical, subacute, 15–25 mm long, 2–4 mm wide in dry state, gradually narrowed below with an indistinct petiole to the base. *Inflorescence* single; 4–6 cm long, the raceme erect, distichous, successively many-flowered, often bearing a capsule, with frequent remnants of old racemes; floral bracts infundibular, acute, 1.5 mm long; pedicels 1 mm long; ovary 0.75 mm long; peduncle 1–2 cm long, from a node at the tip of the ramicaul; flowers purple; *sepals* diffusely cellular, minutely pubescent toward the base, expanded, broadly ovate to subcircular, broadly obtuse, 3-veined, connate below the middle, the dorsal sepal 2 mm long, 2.4 mm wide; the lateral sepals 1.75 mm long, 2 mm wide; *petals* thin, transversely obovate, concave, slightly thickened on the margin of a rounded apex, 0.5 mm long, 0.6 mm wide, 1-veined; *lip* subquadrate, type A, 0.4 mm long, 0.6 mm wide, 0.5 mm deep, shallowly concave below a thick bar with a narrow glenion, the apex rounded with a narrow margin, the dorsum slightly convex, the base truncate, hinged to the base of the column; *column* clavate, 0.6 mm wide and long, the anther and the bilobed stigma apical.

**Etymology:** From the Latin *fecundus*, “fruitful,” referring to the frequent production of capsules.

This small, caespitose species is another in the great number of variations attributed to *Stelis pusilla* Kunth. It is distinguished by erect, successively many-flowered racemes of small flowers, that often produce capsules. The flowers are larger with sepals two to two and a half millimeters long instead of less than two millimeters, and minutely pubescent toward the base. Single-veined petals are similar, but the apex of the lip is broadly rounded without an apiculum.

**Stelis fusilifera** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Putumayo: E of San Francisco toward Mocoa, 2200 m, 2 August 1978, C. Luer, J. Luer & R. Escobar 3139 (Holotype: SEL). Fig. 19.

This small, caespitose species is characterized by slender ramicauls shorter than narrowly acute leaves that are exceeded by a lax, successively flowered raceme of small flowers with broadly obtuse, three-veined sepals; thin, three-veined petals; and an obtuse lip with a glenion and a rounded callus.

*Plant* small to medium-sized, epiphytic, caespitose. Ramicauls erect, slender, 2–3 cm long, with a close, tubular sheath from below the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 4–7 cm long including a petiole 1.5–2 cm long, the blade 0.5–0.7 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 7–15 cm tall, the racemes erect, subclax, distichous, successively-flowered with 6–8 flowers open simultaneously; floral bracts oblique, acute, 2–2.5 mm long; pedicel 1 mm long; ovary 1 mm long; the peduncle ca. 3 cm long, subtended by a slender spathe ca. 5 mm long, from a node near the apex of the ramicaul; flowers purple; *sepals* expanded, microscopically pubescent, broadly ovate, obtuse, 3-veined, connate to near the middle, the dorsal sepal 1.75 mm long, 2.5 mm wide, the lateral sepals 1.75 mm long, 1.75 mm wide; *petals* purple, transversely elliptical, 0.75 mm long, 1.25 mm wide, 3-veined, the apex broadly rounded, concave below a narrowly thickened margin; *lip* ovoid, 0.5 mm long, 0.75 mm wide, 0.5 mm deep, concave below the bar with a glenion, the apex obtuse, the dorsum with a central, suborbicular callus, the base truncate, hinged to the base of the column; *column* stout, ca. 0.75 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *fusilifer*, “little spindle-bearer,” referring to the slender, spindle-shaped inflorescence.

**Additional specimen examined:** COLOMBIA. Tolima: southern slope of Mt. Tolima, 2600 m, 21 April 1982, C. Luer, J. Luer & R. Escobar 7494 (SEL).

This graceful, little species is characterized by acute, narrow leaves and a slender, fusiform raceme of simultaneous flowers. The dorsal sepal is transversely ovate, deeply connate, very minutely pubescent and three-veined, and the petals are thin and three-veined. The lip is type A.

**Stelis gerontica** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Antioquia: Urrao, El Llaverio, 1500 m, coll. by M. Zapata, fl. in cult. at Colomborquídeas, 12 December 1992, R. Escobar 5022 (Holotype: MO), C. Luer illustr. 21908. Fig. 20.

This small, caespitose species is distinguished by obtuse, elliptical leaves with much shorter ramicauls, and a twice longer raceme with colorful flowers that are proportionately large for the plant; three-veined, pubescent sepals; three-veined petals; and a lip with a narrow, longitudinal glenion and a round, apiculate apex.

*Plant* small, epiphytic, caespitose; roots slender. Ramicauls erect, slender, 1–1.3 cm long, enclosed with a tubular sheath below the middle, and another sheath at the base. *Leaf* erect, coriaceous, elliptical, obtuse to rounded at the apex, 2–3 cm long including a petiole 0.5–0.7 cm long, the blade 1 cm wide preserved in liquid, cuneate below into the petiole. *Inflorescence* single; 4–6 cm long, the raceme strict, distichous, loosely flowered below to congested above, several flowers open simultaneously; floral bracts oblique, acute, 2 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle 4–5 cm long, from a node above the apex of the ramicaul; *sepals* similar, expanded, light rose, shortly pubescent, ovate to rounded at the apex, more or less convex, 3-veined, connate in basal quarter, 4 mm long, 4 mm wide; *petals* orange, transversely oblong, concave, the apex broadly rounded with the margin thickened, 0.9 mm long, 1.4 mm wide, 3-veined, without a transverse carina; *lip* type C, dark yellow-orange, subquadrate, 0.7 mm long, 0.8 mm wide, 0.4 mm deep, shallowly concave below a convex bar with a narrow, longitudinal glenion, the apex with a narrow margin and a minute apiculum, the base truncate, hinged to the base of the column; *column* clavate, ca. 1 mm wide and long, the anther and stigmatic lobes apical.

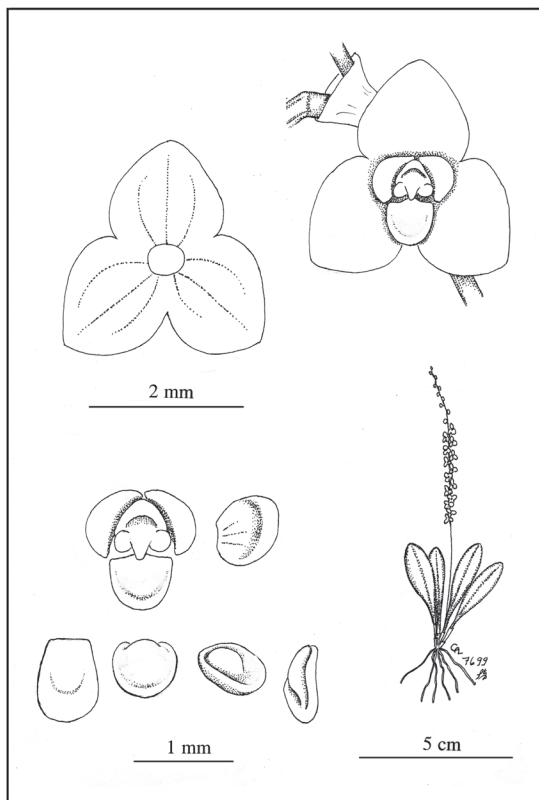
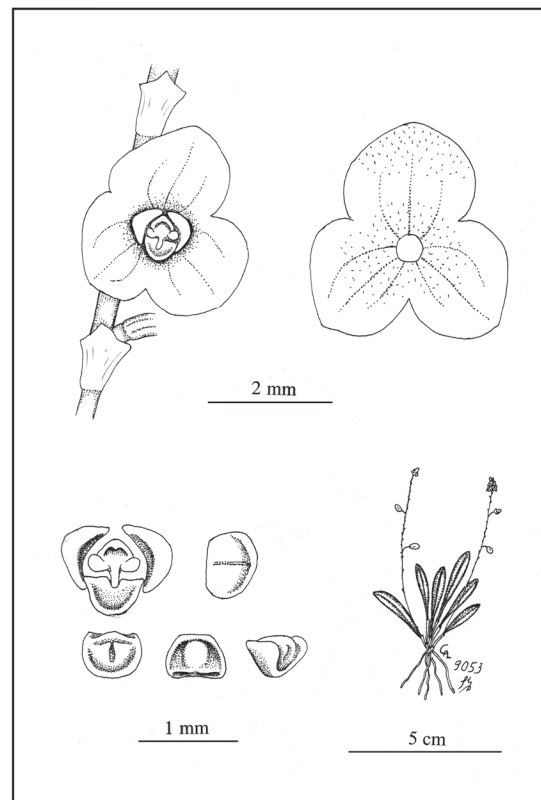
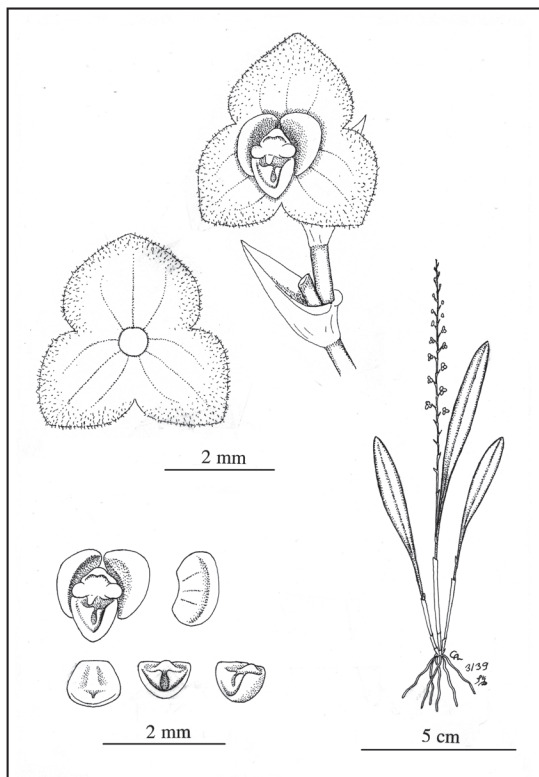
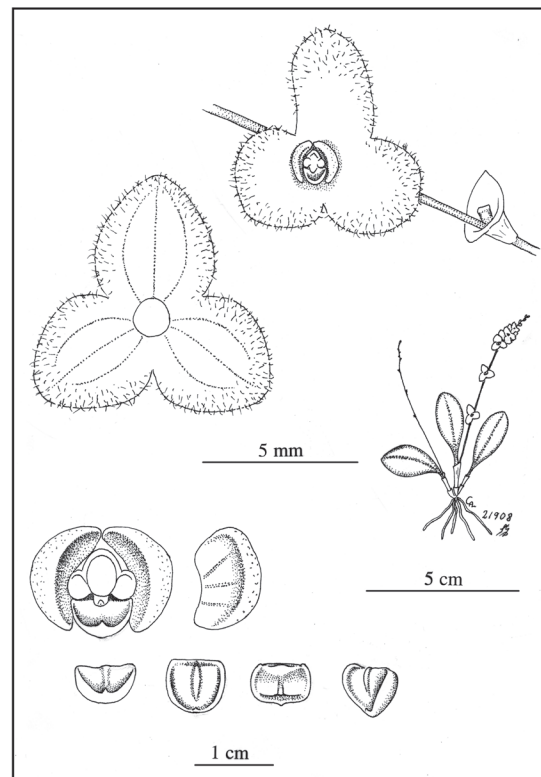
**Etymology:** From the Greek *gerontikos*, “like a little old man,” referring to a fancied appearance of the plant.

This small, caespitose species is related to the variable and seemingly ubiquitous *Stelis argentata* Lindl., from which it, as well as from all other variations, differs by the small habit with ramicauls about one centimeter long, and pubescent, obtuse sepals about four millimeters long and wide. The petals and the lip do not differ significantly.

**Stelis gigapetala** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Antioquia: near El Retiro, 2280 m, 26 April 1983, C. Luer, J. Luer & R. Escobar 8828 (Holotype: SEL). Fig. 21.

This large, caespitose species is characterized by slender ramicauls; an acute, elliptical leaf; one or two racemes longer than the leaf; five-veined sepals about three millimeters long and wide; and thick, five-veined petals two millimeters wide.

*Plant* large, epiphytic, caespitose. Ramicauls erect, slender, 12–20 cm long, with a close, tubular sheath from below the middle, and another 2–3 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 10–13 cm long including a petiole 1–1.5 cm long, the blade 2.5–3 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 15–18 cm long, the racemes erect, subclax, distichous, mostly simultaneously flowered; floral bracts oblique, obtuse, 1.5 mm long; pedicel 1.5 mm long; ovary 1.5 mm long; the peduncle ca. 5 cm long, subtended by a spathe 5–7 mm long, from a node near the apex of the ramicaul; *sepals* light green, more or less suffused with purple externally, expanded, glabrous, broadly ovate, obtuse, 5-veined, connate below the middle, the dorsal sepal 3.5 mm long, 4 mm wide, the lateral sepals 3 mm long, 3.5 mm wide; *petals* green, transversely semilunate, 1 mm long,

FIGURE 17. *Stelis elementaria* Luer & R.EscobarFIGURE 18. *Stelis fecunda* Luer & R.EscobarFIGURE 19. *Stelis fusilifera* Luer & R.EscobarFIGURE 20. *Stelis gerontica* Luer & R.Escobar

2 mm wide, the apex broadly rounded with a thick margin, the corners acuminate, concave below a transverse carina, 5-veined; *lip* green, subquadrate, 0.8 mm long, 0.8 mm wide, 0.6 mm deep, with a short cavity between the bar and an obtuse apex with thick, flat margins, the dorsum with a central, suborbicular callus, the base truncate, hinged to the base of the column; *column* stout, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Greek *gigapetalon*, "gigantic petals," referring to the petals more than twice larger than the lip.

This large, caespitose species is characterized by one or two racemes longer than acute, elliptical leaves, and five-veined sepals. The column and lip are surrounded by proportionately large, thick, five-veined petals. The lip is shortly concave between a shallowly notched bar and a thick, flat, apical margin.

The flowers of *Stelis gigapetala* are similar to those of *Stelis galapagosensis* Luer & R.Escobar, but differ with five-veined petals, and a lip with the dorsum not acutely deflexed.

**Stelis hyacinthalis** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Tolima: southern slope of Mt. Tolima, N of Ibagué, 2930 m, 21 April 1982, C. Luer, J. Luer & R. Escobar 7509 (Holotype: SEL). Fig. 22.

This species is related to *Stelis chocoënsis* O.Duque, but differs in a stout, thicker ramicaul, broader leaves, glabrous sepals, smooth-margined petals, and a lip concave below an intact bar.

*Plant* medium or large, epiphytic, densely caespitose, roots slender. Ramicauls erect, stout, 4–9 cm long, with a close, tubular sheath near the middle and another 2 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, subacute, 6–8 cm long including a petiole less than 1 cm long, the blade 1.5–2.5 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 4–6 simultaneous; 3.5–4 cm long, the racemes erect, strict, congested, distichous, many-flowered with most flowers open simultaneously; floral bracts tubular, subacute, 2 mm long; pedicels 2 mm long; 2 mm long; ovary 2 mm long, the peduncle nil, flowering from the base with a broad spathe ca. 7 mm long, from a node below the apex of the ramicaul; *sepals* dark purple, glabrous, broadly ovate, obtuse, 2 mm long, 2 mm wide, 3-veined, connate below the middle; *petals* yellow, transversely ovate, concave, the apex obtuse with the margin thickened, a transverse carina not seen, 0.8 mm long, 1.2 mm wide, 3-veined; *lip* yellow, subquadrate, 0.5 mm long, 0.9 mm wide, 0.4 mm deep, concave below a curved, entire bar without a glenion, the apex obtuse with an obtuse, triangular tip, the dorsum slightly convex; the base truncate, hinged to the base of the column; *column* clavate, ca. 0.8 mm wide and long, the anther and bilobed stigma apical.

**Etymology:** From the Latin *hyacinthalis*, "like a hyacinth," referring to the appearance of the inflorescence.

This species is similar to *Stelis chocoënsis* O.Duque from the Western Cordillera, but *Stelis hyacinthalis* from the Central Cordillera differs by a stronger habit with thicker,

proportionately shorter ramicauls, wider leaves, and flowers with glabrous sepals and smooth-margined petals. The lip differs in being half as long with a curved, intact bar without a glenion.

**Stelis hypsela** Luer, *sp. nov.* TYPE: COLOMBIA. Chocó: San José del Palmar, Cerro Torrá, mesa below the summit, 2500 m, 13 August 1988, P.A. Silverstone-Sopkin 4357 (Holotype: MO; Isotype: CUVC), C. Luer illustr. 21993. Fig. 23.

This species is remarkable for small flowers in a tall, secund raceme that far surpasses an ovate, acute, long-petiolate leaf; concave, three-veined petals; and a minute lip with an acute, triangular apex.

*Plant* medium, but tall, epiphytic, densely caespitose; roots slender. Ramicauls slender, 6–8 cm long, enclosed by long, close, tubular sheath from below the middle, and another 1–2 sheaths at the base. *Leaf* erect, coriaceous, ovate, acute, petiolate, 6–7 cm long, 0.8–1.3 cm wide in dry state, contracted below into a slender petiole ca. 2.5 cm long. *Inflorescence* single; 15–25 cm long, the raceme erect, congested, strict, secund, many-flowered with most flowers open simultaneously; floral bracts, short, obtuse, 1–1.5 mm long, 1.5 mm wide; pedicels 1 mm long; ovary 0.75 mm long; peduncle 5–8 cm long, subtended by a spathe ca. 1 mm long, from a node below the apex of the ramicaul; *sepals* pale green, suffused with purple toward the base, glabrous, the dorsal sepal antrorse, elliptical, obtuse, concave, 3 mm long, 1.5 mm wide expanded, 3-veined, connate basally, the lateral sepals connate below the middle, but connivent into a concave synsepal, each sepal 3 mm long, 1.6 mm wide. *petals* transversely oblong, concave, 0.5 mm long, 0.75 mm wide, 3-veined, the apex broadly rounded with a thickened margin; *lip* trilobed, ca. 0.5 mm long, 0.6 mm wide, 0.4 mm deep, the lateral lobes rounded, the apical lobe acute, triangular, the dorsum thickened with a low, central callus, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.5 mm wide and long, the anther and the bilobed stigma apical.

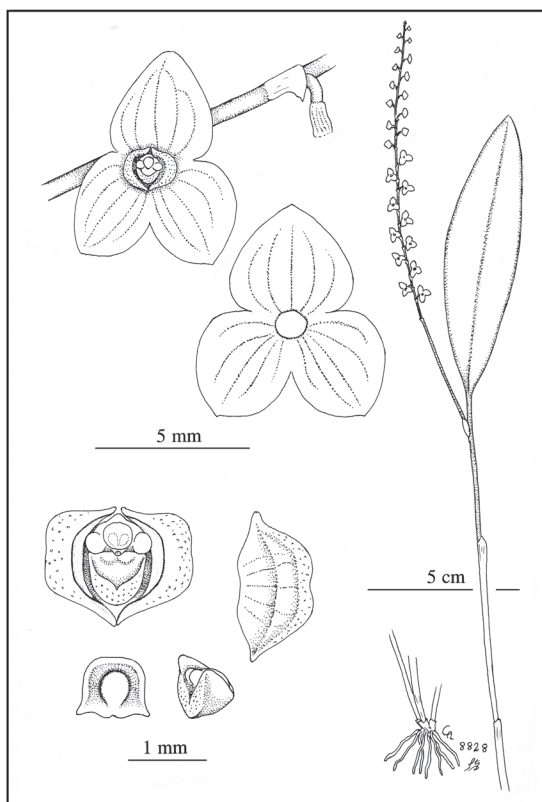
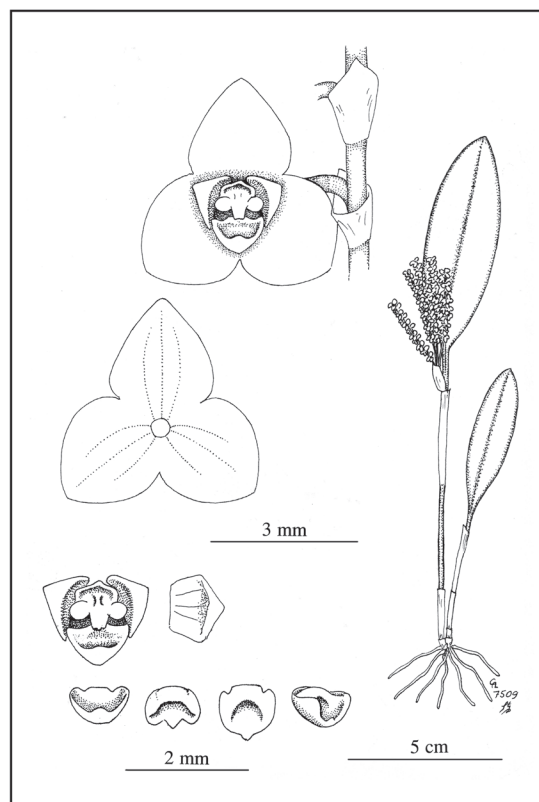
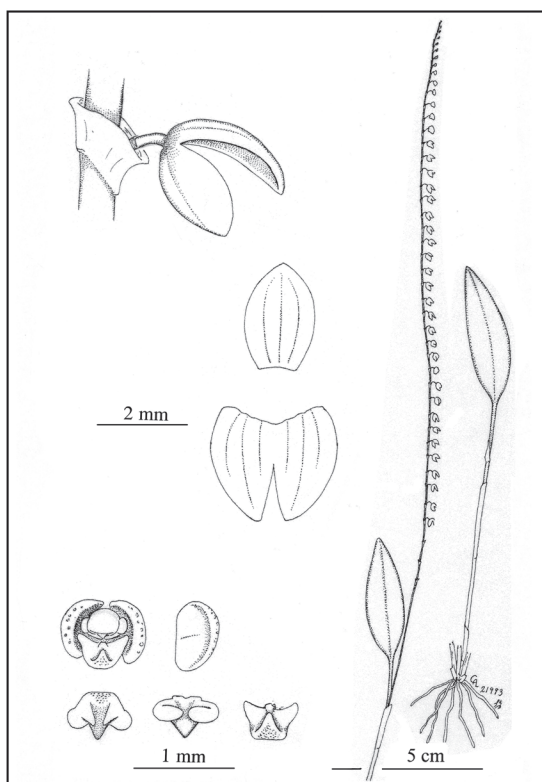
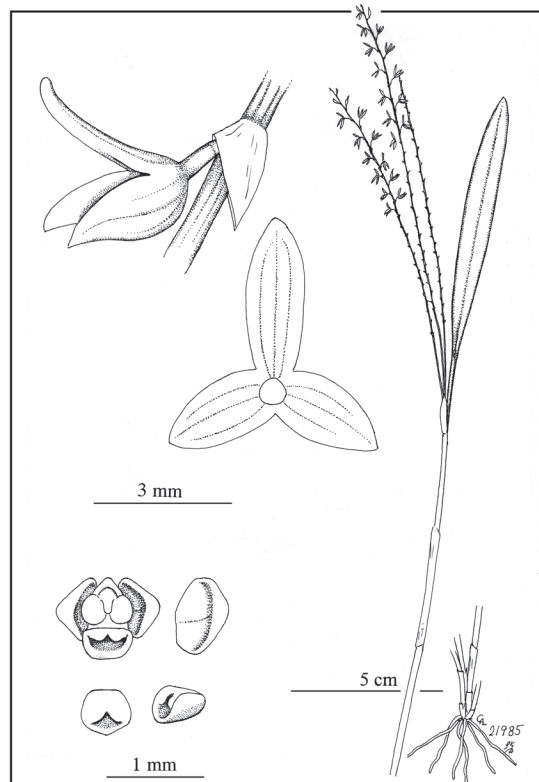
**Etymology:** From the Greek *hypselos*, "high," referring to the tall inflorescence.

This species of section *Humboldtia* is remarkable for the tall, secund raceme that far surpasses an ovate, acute, long-petiolate leaf. The flowers are small with connivent lateral sepals, and the petals are concave and three-veined. The minute lip rehydrates poorly, but it is apparently type A with modifications including an acute, triangular apex.

**Stelis jorgei** Luer, *sp. nov.* TYPE: COLOMBIA. Valle del Cauca: Cali, Finca Zingara, between Cali and Buenaventura, 1900 m, 27 November 1994, Jorge Giraldo-Gensini & Luis Oliver Agredo 558 (Holotype: MO; Isotype: TULV), C. Luer illustr. 21985. Fig. 24.

This slender, caespitose species is related to *Stelis furfuracea* F.Lehm. & Kraenzl., but the flowers are smaller and with similar, narrowly ovate, acute sepals that are also infested with an irregular, unidentified substance; the petals are single-veined; and the dimensions of the minute lip are half as the size.



FIGURE 21. *Stelis gigapetala* Luer & R. EscobarFIGURE 22. *Stelis hyacinthalis* Luer & R. EscobarFIGURE 23. *Stelis hypsela* LuerFIGURE 24. *Stelis jorgei* Luer

*Plant* medium in size, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 12–14 cm long, with a tubular sheath from near the middle and 2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical-oblong, acute, 8–10 cm long including a petiole ca. 1.5 cm long, the blade 0.8–1.1 cm wide in dry state, cuneate below into the petiole. *Inflorescence* 2–4; 10–18 cm long, the raceme erect, subax, distichous, many-flowered; floral bracts oblique, acute, 2 mm long; pedicels 2 mm long; ovary 1 mm long; spathe slender ca. 1 cm long, from a node below the apex of the ramicaul; flowers ascending, yellow; *sepals* glabrous, with minute, irregular crystal-like substances, narrowly ovate, acute, 3-veined, connate basally, the dorsal sepal 3.5 mm long, 1.5 mm wide, the lateral sepals oblique, 3 mm long, 1.5 mm wide, antrorse; *petals* transversely ovate, thin, concave below the thickened, obtuse margin, 0.5 mm long, 0.75 mm wide, 1-veined; *lip* subquadrate, 0.4 mm long, 0.4 mm wide, 0.3 mm deep, concave below thick, rounded, cleft bar, the apex obtuse, the dorsum slightly concave, the base truncate, hinged to the base of the column; *column* stout, ca. 0.5 mm long and wide, with the anther and the bilobed stigma apical.

**Eponymy:** Named for Jorge Giraldo-Gensini, co-collector of this species.

This slender species is related to *Stelis furfuracea* F.Lehm. & Kraenzl., both being characterized by narrowly ovate, nearly free, more or less antrorse sepals with irregular deposits of an unidentified material. The flowers of *Stelis jorgei* are smaller, and the parts of the central apparatus are less than half the size of those of *S. furfuracea*.

**Stelis luisii** Luer, *sp. nov.* TYPE: COLOMBIA. Valle del Cauca: Cali, between Cali and Buenaventura, via a Dapa, 1900 m, 31 November 1994, *Jorge Giraldo-Gensini & Luis Oliver Agredo* 425 (Holotype: MO; Isotype: TULV), C. Luer illustr. 21986. Fig. 25.

This caespitose species is distinguished by elliptical, petiolate leaves born by longer ramicauls and exceeded by one or two racemes of green flowers with pubescent, broadly ovate, three-veined sepals, three-veined petals, and an obtuse lip concave below a shallowly cleft bar.

*Plant* medium in size, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 6–8 cm long, with a tubular sheath from near the middle and 2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 5–7 cm long including a petiole ca. 1.5 cm long, the blade 1.5–2 cm wide in dry state, abruptly contracted below into the petiole. *Inflorescence* 1–2; 6–10 cm long, the raceme erect, strict, subax, distichous, many-flowered; floral bracts oblique, acute, infundibular, 2 mm long, 3 mm long toward the base; pedicels 1–1.5 mm long; ovary 1 mm long; spathe slender ca. 1 cm long, from a node below the apex of the ramicaul; flowers green; *sepals* expanded, pubescent within, broadly ovate, 3-veined, connate below the middle, the dorsal sepal subacute, 2.5 mm long, 3 mm wide, the lateral sepals obtuse, oblique, 2.5 mm long and wide; *petals* transversely ovate, concave below the thickened, obtuse margin, 0.75 mm long, 1.3 mm wide,

3-veined; *lip* subquadrate, 0.6 mm long, 0.6 mm wide, 0.5 mm deep, concave below thick, rounded, shallowly cleft bar, the apex obtuse, the dorsum slightly concave, the base truncate, hinged to the base of the column; *column* stout, ca. 0.6 mm long and wide, with the anther and the bilobed stigma apical.

**Eponymy:** Named for Luis Oliver Agredo, co-collector of this species.

Although no single character is distinctive, this handsome species is characterized by green, broadly ovate, pubescent sepals in one or two racemes that exceed elliptical, abruptly petiolate leaves. The petals are three-veined and the lip is type A, simply concave below a shallowly cleft bar.

**Stelis meerenbergensis** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Huila: near Hacienda Meerenberg, 2300 m, fl. in cult. by Hacienda Meerenberg, 18 November 1982, C. Luer, J. Luer & G. Buch 8485 (Holotype: SEL). Fig. 26.

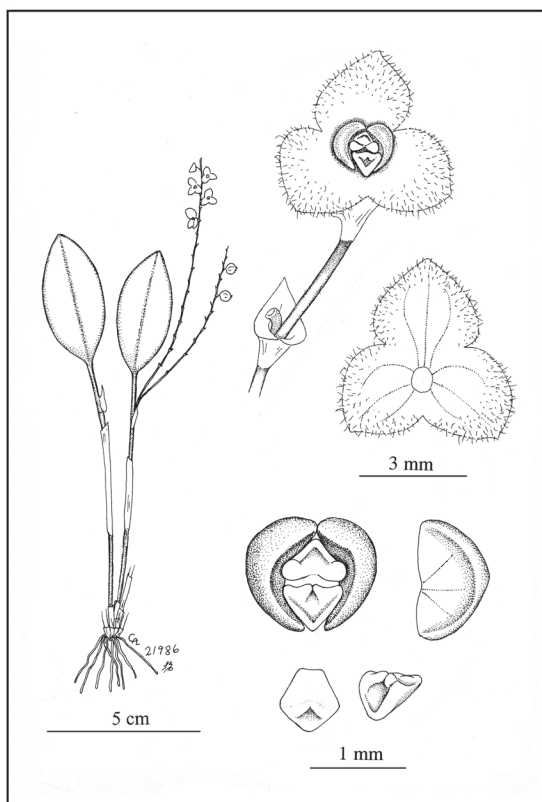
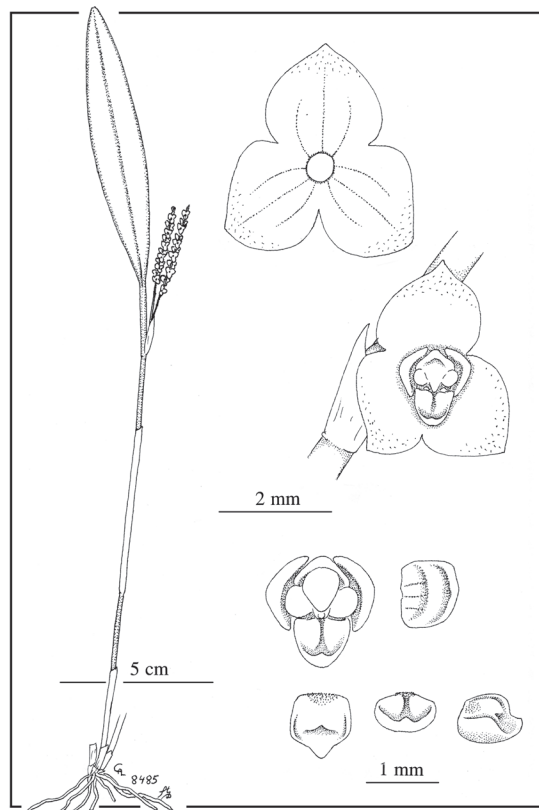
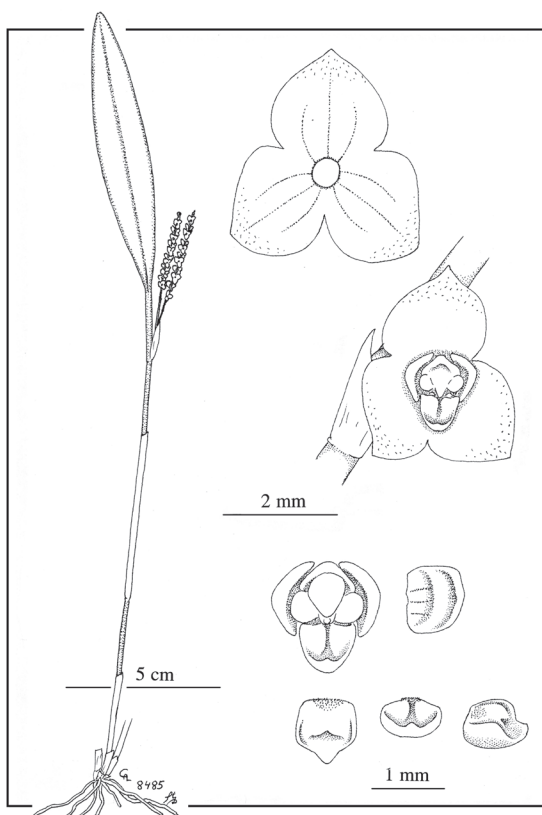
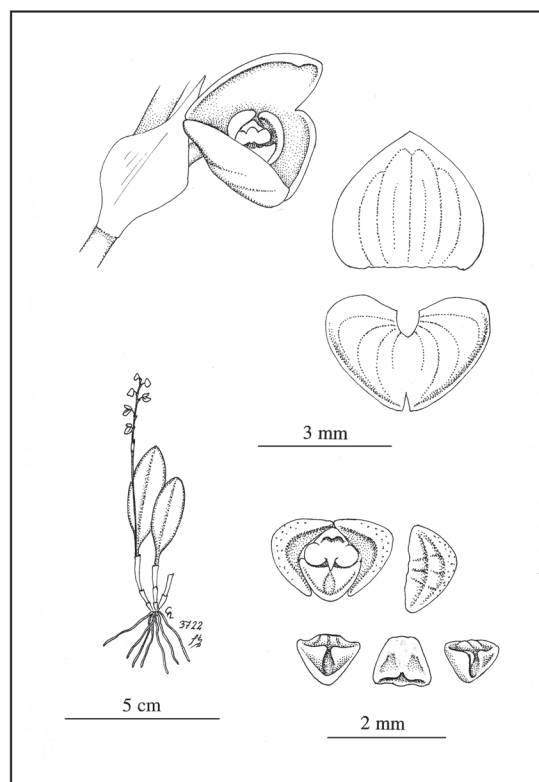
This tall, slender, caespitose species is characterized by a narrowly elliptical leaf; two simultaneous racemes less than half as long as the leaf; yellow, broadly ovate, 3-veined sepals; broad, three-veined petals; and a subquadrate lip with an obtuse tip.

*Plant* large, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, elongated, 14–16 cm long, with a close, tubular sheath from below the middle and another 2 sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, subacute, 10–12 cm long including a petiole 2 cm long, the blade 1.5 cm wide in dry state, cuneate below into the petiole. *Inflorescence* 2; 5–5.5 cm long, the racemes erect, strict, congested, distichous, many-flowered; floral bracts oblique, acute, 2.5 mm long; pedicels 1.5 mm long; ovary 1.5 mm long; the peduncle ca. 2 cm long, with a spathe 1.5 cm long, from a node below the apex of the ramicaul; flowers yellow; *sepals* glabrous, diffusely microscopically cellular, expanded, broadly ovate, obtuse, 2 mm long, 2.25 mm wide, 3-veined, connate below the middle; *petals* broadly oblong-subquadrate, broadly obtuse, concave, with a transverse carina, the apical margin thickened, 1.25 mm long and wide, 3-veined; *lip* subquadrate, 1 mm long, 1 mm wide, 0.5 mm deep, the apex obtuse with the tip subacute, concave below a thick, shallowly cleft bar, the dorsum slightly convex, the base truncate, hinged to the base of the column; *column* clavate, ca. 1.2 mm wide and long, the anther and bilobed stigma apical.

**Eponymy:** Named for Hacienda Meerenberg near the area of collection.

*Stelis meerenbergensis* is characterized by two simultaneous racemes much shorter than a narrowly elliptical leaf borne by a long, slender ramicaul. The flowers are yellow and small with obtuse, three-veined sepals; broad, 3-veined petals; and an obtuse, subquadrate lip.

**Stelis niessen-andreae** Luer, *sp. nov.* TYPE: COLOMBIA. Valle del Cauca: without collection data, fl. in cult. at Orquídeas del Valle, 15 March 1997, C. Luer 18432 (Holotype: MO). Fig. 27.

FIGURE 25. *Stelis luisii* LuerFIGURE 26. *Stelis meerenbergensis* Luer & R. EscobarFIGURE 27. *Stelis niessen-andreae* LuerFIGURE 28. *Stelis octavioi* Luer & R. Escobar

This medium-sized species is distinguished by a short, stout ramicaul, much shorter than a large, elliptical leaf; an elongating, successively many-flowered raceme that far exceeds the leaf; elliptical, three-veined sepals; one-veined petals; and a concave, elliptical lip.

*Plant* medium in size, epiphytic, caespitose; roots fleshy. Ramicauls erect, stout, 1.5–2 cm long, enclosed by a tubular sheath from near the base, and another sheath at the base. *Leaf* erect, coriaceous, elliptical, subacute, 12–15 cm long including a petiole 3–4 cm long, the blade 3 cm wide, narrowed below to the petiole. *Inflorescence* single, to 30 cm long, the raceme flexible, distichous, successively many-flowered with 10–12 flowers open simultaneously; floral bracts oblique, acute, 1.5 mm long; pedicel 1.5 mm long; ovary 1 mm long; the peduncle 6–8 cm long, subtended by a spathe 5–6 mm long, from a node below the apex of the ramicaul; flowers dark rose; *sepals* similar, glabrous, elliptical-ovate, obtuse, 4 mm long, 4 mm wide, 3-veined, connate basally; *petals* transversely ovate, concave, the apex obtuse, the margin slightly thickened, 1 mm long, 1.6 mm wide, 1-veined; *lip* elliptical, 2 mm long, 1.3 mm wide, 0.6 mm deep, concave below a narrow, deeply cleft, transverse bar at the base, the apex obtuse with indistinctly thickened margins, the base narrow, truncate, hinged to the column-foot; *column* stout, ca. 0.5 mm long and wide, the anther and stigmatic lobes apical.

**Eponymy:** Named for Andrea Niessen de Uribe of Orquídeas del Valle, Cali, Colombia.

This small, but “large,” caespitose species is characterized by a short, stout ramicaul and a much larger, elliptical, petiolate leaf. A much longer, successively many-flowered raceme retains about a dozen flowers open toward the apex. The sepals are glabrous, obtuse and three-veined, and the petals are single-veined. The larger, ovate lip is concave with a barely thickened margin, the bar being basal and deeply cleft.

**Stelis octavioi** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Putumayo: between Sibundoy and Mocoa. 2200 m, 20 January 1979, C. Luer, J. Luer, R. Escobar & O. Ospina 3722 (Holotype: SEL). Fig. 28.

This small, caespitose species is distinguished by a several-flowered raceme that exceeds the leaf; proportionately large, acuminate floral bracts; small flowers with multiveined dorsal sepal and synsepal; and a subacute, shallowly concave lip with a glenion.

*Plant* small, epiphytic, caespitose; roots slender. Ramicaul erect, relatively stout, 1–2 cm long, with a loose, tubular sheath from below the middle, and another 1–2 sheaths about the base. *Leaf* erect, coriaceous, elliptical, subacute to rounded at the tip, 2–3.5 cm long including a petiole 0.5–0.7 cm long, the blade 1–1.3 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; 6 cm tall, the raceme erect, distichous, subclax, simultaneously flowered with ca. 6 flowers; floral bracts oblique, acute, acuminate, 4 mm long; pedicels ca. 1 mm long; ovary 1 mm long; peduncle 4 cm long, subtended by a spathe within the sheath, from a node at the apex of the ramicaul; flowers pale

yellow; *sepals* glabrous, the dorsal sepal transversely ovate, obtuse 3 mm long, 3.5 mm wide, 5-veined, or 7-veined if a pair of incomplete veins are counted, the lateral sepals concave, connate to the near the tips into a transversely ovoid synsepal, 3 mm long, 3.5 mm wide, unexpanded, 8-veined; *petals* transversely semilunate, 0.75 mm long, 1.5 mm wide, 3-veined, with the rounded apical margin thickened, with a transverse callus; *lip* thickly triangular, 0.6 mm long, 1 mm wide, 0.75 mm deep, shallowly concave below a cleft bar with a glenion, the apex subacute to obtuse, the dorsum slightly convex with 3 small, parallel calli, the base narrowly truncate, hinged to the base of the column; *column* ca. 0.6 mm broad and long, the anther and stigmatic lobes apical.

**Eponymy:** Named for Brother Octavio Ospina of Sibundoy, co-collector of this species.

This small, caespitose species of section *Humboldtia* is distinguished by a subclax, several-flowered raceme of small flowers with proportionately large, acuminate floral bracts. The dorsal sepal is transverse with five of seven veins and a multiveined synsepal, and the lip is shallowly concave with a glenion.

**Stelis odontopetala** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: above Ricaurte, 1950 m, 2 November 1979, C. Luer, J. Luer & A. Hirtz 4549 (Holotype: SEL). Fig. 29.

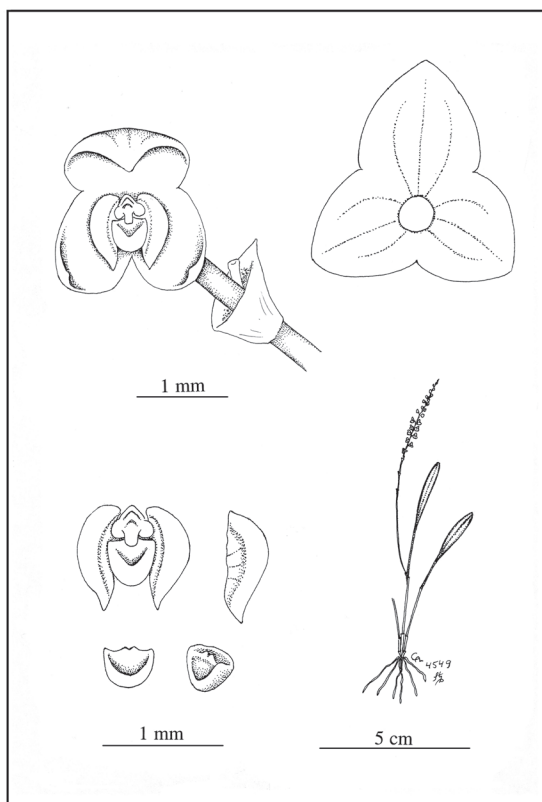
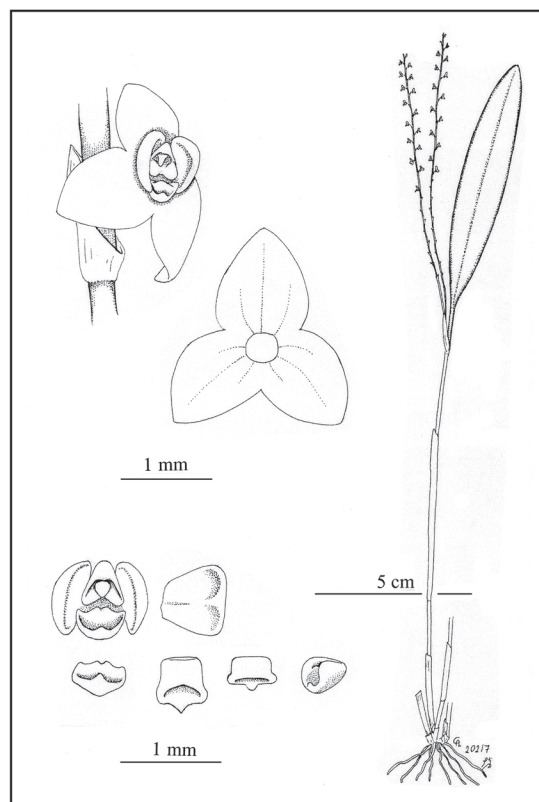
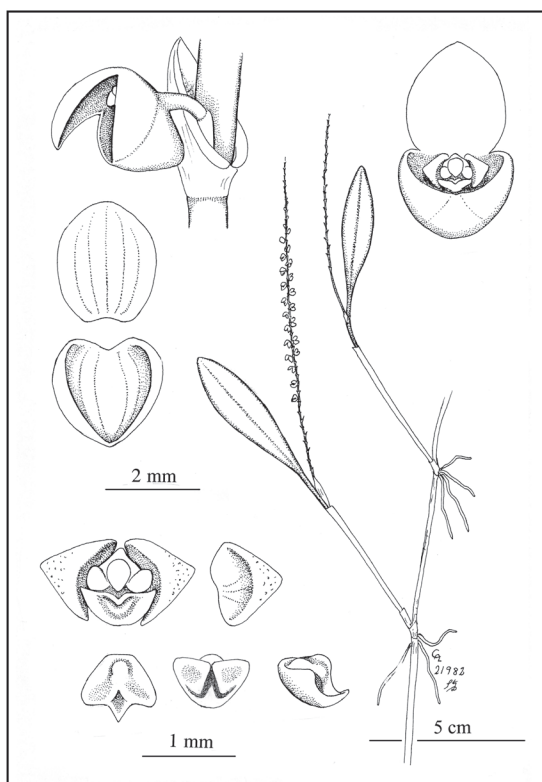
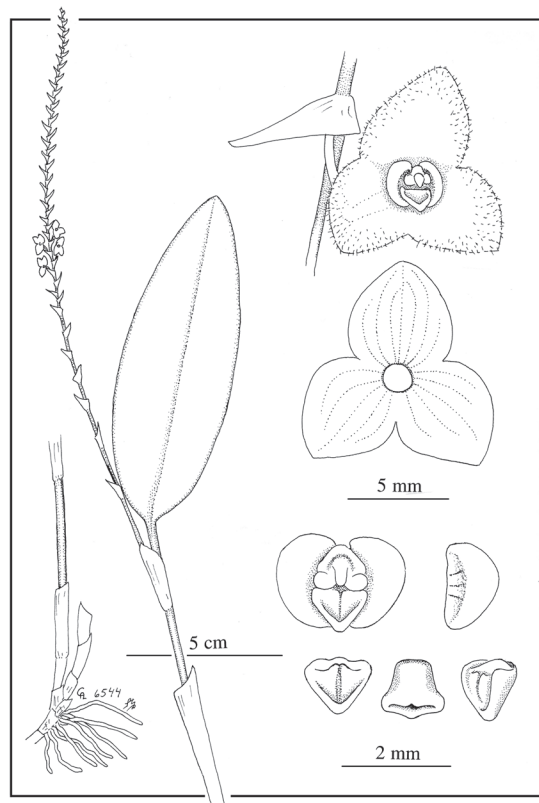
This small, slender, caespitose species is distinguished by a crowded raceme of small flowers with wide petals that descend past the minute lip with acute, acuminate tips.

*Plant* small, epiphytic, caespitose, roots slender. Ramicauls erect, slender, 1.5–2.5 cm long, with a thin, tubular sheath below the middle, and another sheath at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 3–4 cm long including a petiole 1–2.5 cm long, the blade 3–4 mm wide in dry state, cuneate below into the petiole. *Inflorescence* single; to 6 cm long, the raceme erect, strict, distichous, many-flowered; floral bracts oblique, acute, 1 mm long; pedicels less than 1 mm long; ovary less than 1 mm long; peduncle ca. 3 cm long, from a node at the apex of the ramicaul; *sepals* translucent yellow, glabrous, ovate, obtuse, more or less concave, 3-veined, the dorsal sepal 1.5 mm long, 1.4 mm wide, the lateral sepals 1 mm long, 1.4 mm wide; *petals* red, transversely oblong-ovate, 0.5 mm long, 1.25 mm wide, 3-veined, concave below an elongated margin, the upper extremity obtuse, the lower extremity acuminate, acute at the tip that descends past the lip; *lip* red, subovoid, 0.3 mm long, 0.4 mm wide, 0.2 mm deep, concave below a minute, retuse bar, the apex rounded with thick margin, the dorsum ill-defined in this specimen, the base attached to the base of the column; *column* stout, ca. 0.5 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Greek *odontopetala*, “with fang-like petals,” referring to the pair of fang like petals.

This small, weak, caespitose species is characterized by narrowly elliptical, long petiolate leaves that are exceeded by a congested raceme of tiny flowers. The sepals are more



FIGURE 29. *Stelis odontopetala* Luer & HirtzFIGURE 30. *Stelis orphana* LuerFIGURE 31. *Stelis pasminoi* LuerFIGURE 32. *Stelis posadarum* Luer & R.Escobar

or less concave and three-veined. The petals are transversely elongated with acuminate tips descending on either side of the lip like a pair of fangs. The lip is extremely small, and round below a minutely notched bar.

**Stelis orphana** Luer, *sp. nov.* TYPE: COLOMBIA. Without collection data, obtained from Colomborquídeas, fl. in cult. by the San Francisco Conservatory, 31 May 2002, *C. Luer 20217* (Holotype: MO). Fig. 30.

This tall, caespitose species is characterized by a few, loosely, minutely flowered inflorescences longer than narrow, acute, elliptical leaves; three-veined sepals; single-veined petals; and a minute, subquadrate, apiculate lip.

*Plant* large, epiphytic, densely caespitose. Ramicauls erect, slender, 12–15 cm long, with a tubular sheath from near the middle, and another 1–2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 8–10 cm long including a petiole 1–1.5 cm long, the blade 1.2–1.5 cm wide in the dry state, cuneate below to the petiole. *Inflorescence* 1–3, simultaneous; 9–10 cm long, the racemes erect, lax, distichous, many-flowered, flowering from near the base; floral bracts erect, oblique, acute, 1.5 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle nil, subtended by a narrow spathe 15 mm long, from a node below the apex of the ramicaul; flowers yellow; *sepals* glabrous, fleshy, expanded, ovate, subacute to obtuse, 1.25 mm long, 1 mm wide, faintly 3-veined, connate below the middle; *petals* thin, cuneate, 0.75 mm long, 0.75 mm wide, 1-veined, shallowly concave below a slightly thickened, truncate apex; *lip* subquadrate, 0.5 mm long, 0.5 mm wide, 0.3 mm deep, concave below an intact bar, the apex truncate with a short, triangular apiculum, the dorsum featureless, the truncate base hinged to the base of the column; *column* stout, ca. 0.5 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *orphanus*, “an orphan,” referring to its unknown origin.

This species without collection data is tall with slender ramicauls, elliptical leaves, and more than one minutely many-flowered racemes is not unusual in the genus *Stelis*. The sepals and petals, similar to those of *Stelis braccata* Rchb.f. & Warsz., and a subquadrate lip is one of the more common designs. No other species is known with this combination of morphological characters.

**Stelis pasminoi** Luer, *sp. nov.* TYPE: COLOMBIA. Putumayo: Santiago, San Antonio de Bellavista, Páramo de Bordoncillo, 3240 m, 19 March 1999, *S.M. Pasmíño & M.R. Posso 031* (Holotype: MO; Isotype: PSO), *C. Luer* illustr. 21982. Fig. 31.

This long-repent species is related to *Stelis tritriangulata* Luer & R.Escobar, but distinguished by a very congested raceme of twice smaller flowers with five-veined, instead of three-veined sepals.

*Plant* medium in size, epiphytic, long-repent, scandent, the rhizome slender, ca. 5 cm long between ramicauls; roots slender. Ramicauls ascending, erect, 4–5 cm long, with a tubular sheath from near the middle and another sheath at

the base. *Leaf* erect, coriaceous, elliptical, acute, 5–7 cm long including a petiole 1.5–2 cm long, the blade 1–1.5 cm wide in the dry state. *Inflorescence* single; 6–12 cm long, the raceme erect, strict, congested, secund, simultaneously many-flowered; floral bracts oblique, acute, 3–4 mm long; pedicels 1.5 mm long; ovary 1.5 mm long; peduncle 1.5–2 cm long, from a node at the apex of the ramicaul; flowers “lila;” *sepals* glabrous, the dorsal sepal decurved, elliptical, obtuse, 2.5 mm long, 2 mm wide, 5-veined, the lateral sepals connate into an ovoid, deeply concave synsepal, ca. 2.5 mm long, 2.5 mm wide unexpanded; *petals* triangular, deeply concave below the thick apical margin, 0.8 mm long, 0.8 mm wide, 3-veined; *lip* transversely triangular, 0.6 mm long, 0.8 mm wide, 0.5 mm deep, concave below a bar cleft with a glenion, the apex acuminate into an acute, triangular tip, the dorsum convex with a low callus toward the base, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.8 mm wide and long, the anther and the bilobed stigma apical.

**Eponymy:** Named for S.M. Pasmíño, co-collector of this species.

This long-repent species of sect. *Humboldtia* is characterized by a long, congested raceme of small flowers that are similar to those of *Stelis tritriangulata* Luer & R.Escobar, except for being only half as large, and with the sepals being five-veined instead of three-veined. The triangular petals are similarly deeply concave below a thick, acute margin; and also the lip with an acute, triangular tip.

**Stelis posadarum** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Without collection data, fl. in cult. by Colomborquídeas, 1 November 1981, *C. Luer 6544* (Holotype: SEL). Fig. 32.

This large, caespitose species is distinguished by a long, multiflowered raceme with relatively large flowers with multiveined sepals; stout ramicauls with a pair of loose sheaths; thick, semiorbicular petals; and a narrowly obtuse lip.

*Plant* large, epiphytic, densely caespitose, roots coarse. Ramicauls erect, stout, 15–17 cm long, with a loose, tubular sheath on the upper half, another loose, tubular sheath on the lower half, and a tubular sheath at the base. *Leaf* erect, coriaceous, elliptical, obtuse, the blade 11 cm long, 3–4 cm wide, cuneate into a petiole 2.5 cm long. *Inflorescence* solitary; 25 cm long, the raceme erect, distichous, lax below, congested above, many-flowered, floral bracts oblique, acute, 7 mm long below, 5 mm long above; pedicels 5 mm long; ovary 2 mm long; the peduncle ca. 5 cm long, from a node below the abscission layer, with a spathe 2.5 cm long; flowers light green, non-resupinate; *sepals* pubescent within, broadly ovate, obtuse, connate below the middle, the dorsal sepal 5–6 mm long, 5.5 mm wide, 7-veined, the lateral sepals 5 mm long, 4.5 mm wide, 6-veined; *petals* semilunate, thick, concave below a broad, rounded apical margin, without a transverse carina, 1 mm long, 2 mm wide, 3-veined; *lip* subquadrate, 1 mm long, 1.3 mm wide, 1 mm deep, shallowly concave below a slightly elevated bar with a narrow glenion, the apex thick, narrowly obtuse, the dorsum

slightly convex, the base truncate, hinged to the base of the column; *column* stout, ca. 1.3 mm long and wide, the anther and the bilobed stigma apical.

**Eponymy:** Named for Lijia, Jaime and Juan Filipe Posada in whose greenhouse at Colomborquídeas this species was being cultivated.

This large, robust, handsome species is distinguished by stout ramicauls clad in loose, tubular sheaths, and an elliptical leaf abruptly contracted into a petiole. Numerous, relatively large, non-resupinate flowers are produced with oblique floral bracts in a long raceme that becomes crowded near the middle before dissipating at the tip. The sepals broadly ovate, pubescent and multiveined; the semilunate petals are concave below a broad, thick, rounded apical margin; the lip is type A with a narrowly obtuse apex and a narrow glenion.

***Stelis praecipua*** Luer, *sp. nov.* TYPE: COLOMBIA. Nariño: near Laguna La Cocha, along main road from Pasto to Mocoa, 25 June 1960, L.A. Garay 37 (Holotype: AMES), C. Luer illustr. 21964. Fig. 33.

This caespitose species of Sect. *Humboldtia* is distinguished by glabrous sepals with recurved sides; a long, many-flowered raceme; obtuse petals with a broad, thickened margin; and a subquadrate lip concave below a thick, deeply cleft bar and a thick, protruding apex.

**Plant** large, epiphytic to terrestrial in “semiopen, mossy ground,” densely caespitose, roots slender. Ramicauls erect, slender, 9–15 cm long, with a tubular sheath above the middle, and another 2–3 tubular sheaths below and at the base. **Leaf** erect, coriaceous, elliptical, subacute to acute, 7–11 cm long including a petiole ca. 1.5 cm long, the blade 1.5–2 cm wide in dry state, narrowly cuneate below into the petiole. **Inflorescence** 1–2; 20–28 cm long, the raceme erect, congested, strict, many-flowered, distichous; floral bracts oblique, acute, 3 mm long; pedicels 2 mm long; ovary 2 mm long; peduncle ca. 5 cm long, from a node below the apex of the ramicaul; color of flowers not noted, **sepals** glabrous, ovate, subacute, with sides revolute, the dorsal sepal 8 mm long, 3 mm wide, connate to synsepal for 1 mm, 3-veined, the lateral sepals connate to near the apex into a concave synsepal with the sides revolute, each 7 mm long, 4 mm wide, 3-veined; **petals** transversely ovate, concave below a broad, obtuse, margin overlying a transverse callus, 1 mm long, 1.5 mm wide, 3-veined; **lip** subquadrate, 1.8 mm long, 1 mm wide, 1.6 mm deep, concave below a thick, deeply notched bar, the apex thick, concave, protruding, the dorsum with a low, rounded callus, the base attached to the base of the column; **column** stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *precipuus*, “singular, peculiar,” referring to the details of the lip.

This caespitose species of section *Humboldtia* was identified as the Ecuadorian *Stelis velutina* Lindl., a superficially similar species, but it differs from the latter by glabrous sepals with revolute sides. Most distinctive is the lip that is distinguished by a thick, deeply notched bar, and an equally thick, narrowly obtuse, protruding apex.

***Stelis quintella*** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: above Ricaurte, 1600 m, 3 November 1979, C. Luer, J. Luer & A. Hirtz 4589 (Holotype: SEL). Fig. 34.

This small, caespitose species distinguished by a flexuous raceme that more or less equals an elliptical, petiolate leaf; proportionately large, purple, five-veined sepals; thick, three-veined petals; and transverse lip borne behind a fold at the base of the lateral sepals.

**Plant** small, epiphytic, caespitose, roots slender. Ramicauls erect, slender, 1–1.5 cm long, with a tubular sheath below the middle, and another sheath at the base. **Leaf** erect, coriaceous, elliptical, obtuse, 2.5–4 cm long including a petiole 1–1.5 cm long, the blade 0.7–1 cm wide in dry state, cuneate below into the petiole. **Inflorescence** 1–2; 3–4 cm long, the raceme suberect, flexuous, distichous, many-flowered; floral bracts oblique, acute, 3 mm long; pedicels 3 mm long; ovary 1.5 mm long; peduncle 1.5–2 cm long, from a node below the apex of the ramicaul; flowers purple, **sepals** glabrous, transversely ovate, obtuse, 5-veined, deeply connate, the dorsal sepal 4 mm long, 5 mm wide, the lateral sepals 3.5 mm long, 4 mm wide; **petals** semilunate, thick, 0.7 mm long, 1.25 mm wide, concave below a broad, crescent-shaped margin overlying a transverse callus, 3-veined; **lip** transversely subdiscoid, 1 mm long, 1.25 mm wide, 1.5 mm deep, concave below a thick bar, the apex broadly rounded, the dorsum ill-defined in this specimen, the base attached to the base of the column; **column** stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

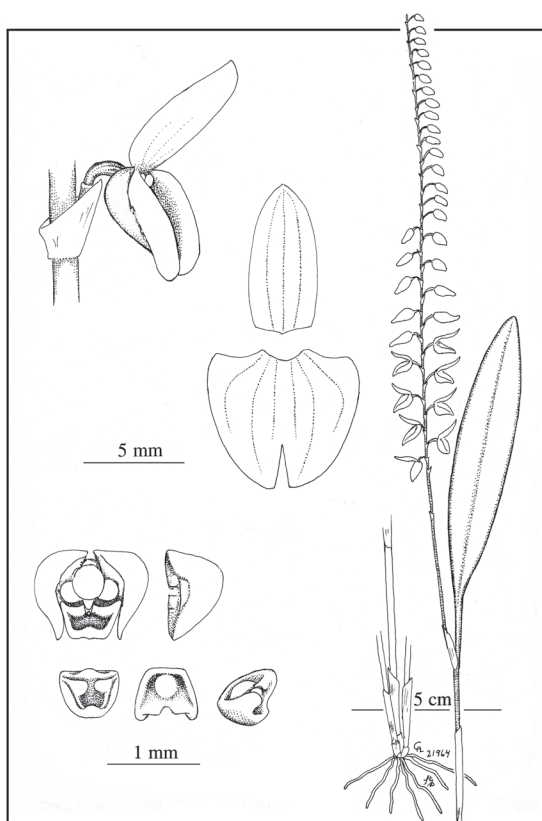
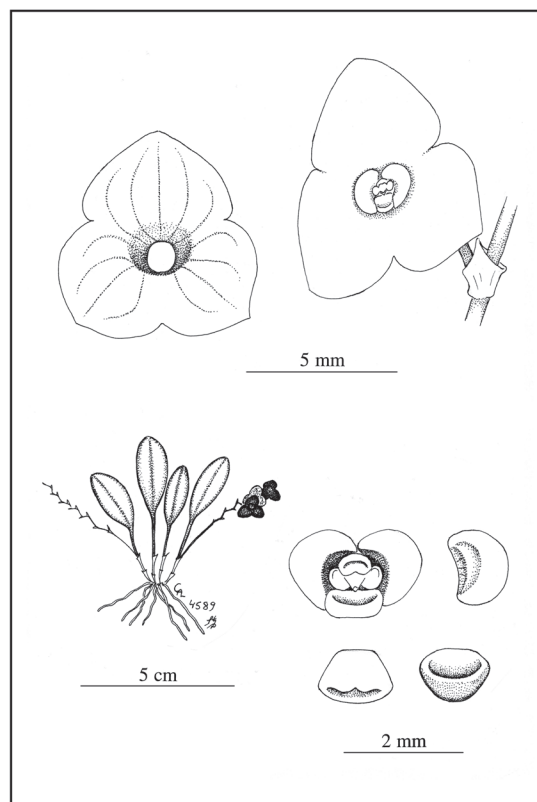
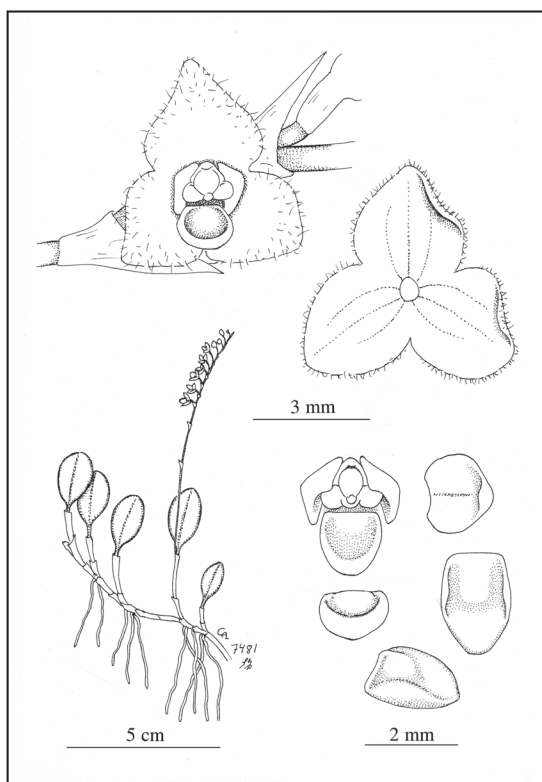
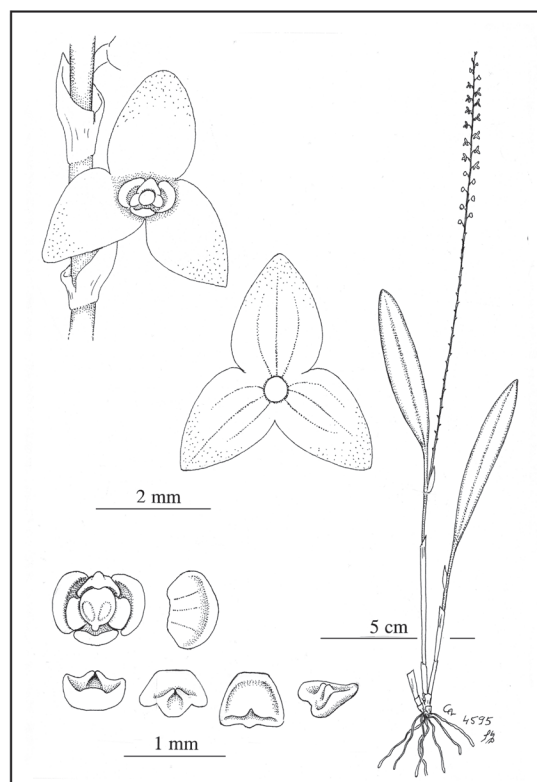
**Etymology:** From the Latin *quintellus*, “a little one with five,” referring to five-veined sepals occurring in a plant of a small size.

This small, caespitose species is one of the smallest known with five-veined sepals. A flexuous raceme of purple flowers more or less equals elliptical leaves. The sepals are transversely ovate, glabrous, deeply connate and five-veined; the petals are crescent-shaped with a broad margin; the lip is a simple type A.

***Stelis remulifera*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Tolima: Alto de Pozo, near the pass, W of Ibagué, 3300 m, 20 April 1982, C. Luer, J. Luer & R. Escobar 7481 (Holotype: SEL). Fig. 35.

This small, long-repent species is distinguished broadly elliptical leaves borne by stout ramicauls far surpassed by the peduncles of a solitary inflorescence; ovate, long-pubescent, ovate sepals; single-veined petals; and a proportionately large, oblong, obtuse lip with a central callus below the middle.

**Plant** small, epiphytic, long-repent, the rhizome stout, 2 mm thick, 1–2 cm between Ramicauls; roots slender. Ramicauls ascending, erect, stout, 1.5–2 cm long, with a tubular sheath from below the middle and another 1–2 sheaths below and about the base. **Leaf** erect, coriaceous, broadly elliptical, obtuse to rounded, 2–2.5 cm long including a petiole 0.5 cm long, the blade 0.9–1.2 cm wide in dry state, abruptly contracted below into the petiole. **Inflorescence** single; 8–10 cm long, the racemes erect, strict, congested, secund, with most flowers open, the peduncle 3–6 cm long,

FIGURE 33. *Stelis praecipua* LuerFIGURE 34. *Stelis quintella* Luer & HirtzFIGURE 35. *Stelis remulifera* Luer & R. EscobarFIGURE 36. *Stelis ricaurtensis* Luer & Hirtz



the raceme 3–3.5 cm long; floral bracts oblique, acute, 4 mm long; pedicels 3 mm long; ovary 1.5 mm long; from a node near the apex of the ramicaul; *sepals* similar, greenish purple with darker purple veins, long-pubescent, ovate, obtuse, 3 mm long, 3 mm wide, 3-veined, connate below the middle; *petals* yellow, transversely ovate, 1.3 mm long and wide, 1-veined, concave, the apex obtuse, thickened only at the tip; *lip* yellow, oblong, rounded at the tip, 2 mm long, 1.6 mm wide, 1 mm deep, shallowly concave with thin margins, filled below the middle with a smooth, rounded callus, the base truncate, hinged to the base of the column; *column* clavate, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *remulifer*, “oar, or paddle bearing,” referring to the ramicauls and leaves.

This small, creeping species is distinguished by the paddle-shaped leaves with short ramicauls. The inflorescence far exceeds the leaf with the peduncle about twice longer than the leaf. The pubescence of the sepals is fine and long. The petals are thin and single-veined. The proportionately large, oblong lip is two millimeters long. Below the middle the bar is replaced by a smooth callus, above the middle the lip is simply concave with thin margins.

**Stelis ricaurtensis** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: above Ricaurte, 1600 m, 3 November 1979, C. Luer, J. Luer & A. Hirtz 4595 (Holotype: SEL). Fig. 36.

*Plant* medium in size, caespitose, with slender ramicauls and elliptical leaves; a longer raceme of small flowers with subacute, glabrous, three-veined sepals; thin, three-veined petals; and a transverse, subtrilobate lip with a cleft glenion.

*Plant* medium in size, epiphytic, caespitose. Ramicauls erect, slender, 3–7 cm long, with a close, tubular sheath from below the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 5–7 cm long including a petiole 1.5 cm long, the blade 1–1.2 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; 12–14 cm long, the raceme erect, strict, congested, flowering from near the base with many flowers open simultaneously; floral bracts oblique, acute, 2–2.5 mm long; pedicel 2 mm long; ovary 1 mm long; the peduncle ca. 5 mm long, subtended by a slender spathe 1 cm long, from a node near the apex of the ramicaul; flowers yellow; *sepals* glabrous-cellular, similar, ovate, subacute, three-veined, connate to near the base, 2.5 mm long, 2 mm wide. *petals* thin, transversely elliptical, concave, 0.5 mm long, 0.8 mm wide, 3-veined; *lip* transversely sublobulate, 0.5 mm long, 0.8 mm wide expanded, 0.4 mm deep, concave below an elevated bar with a cleft glenion, the apex truncate subtrilobulate, the lateral angles rounded, flanking a similar, central rounded protrusion, the base truncate, connate to the base of the column; *column* stout, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** Named for community of Ricaurte, near the site of collection.

Vegetatively, this medium-sized, caespitose species with narrowly acute, elliptical leaves borne by ramicauls

about equally long; ovate, acute, three-veined sepals; thin, three-veined petals; and a type A lip with a glenion is not remarkable. It is distinguished from the horde of others by the combination of the above morphological characters. The details of the lip cannot be certain, because the lip is described from a rehydrated flower.

**Stelis risaraldae** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Risaralda: Pueblo Rico, Alto de Linea, 2100 m, 11 May 1993, C. Luer, J. Luer & R. Escobar 16775 (Holotype: MO). Fig. 37.

This small, caespitose species is characterized by slender ramicauls about equal to acute, ovate leaves; one or two distichous racemes shorter than the leaf; broadly ovate, obtuse, ciliate, three-veined sepals; broad, thick, three-veined petals; and a small, rounded lip.

*Plant* small, epiphytic, caespitose. Ramicauls erect, slender, 4–5 cm long, with a tubular sheath from below the middle, and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, ovate, acute, 4–5 cm long including a petiole 1–1.5 cm long, the blade 1–1.6 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 4–4.5 cm long, the racemes erect, subaxillary, distichous, successively-flowered with 5–6 flowers open simultaneously; floral bracts tubular, obtuse, 1.5 mm long; pedicel 1.5 mm long; ovary 1 mm long; the peduncle ca. 1.5 cm long, subtended by a slender spathe 3–4 mm long, from a node near the apex of the ramicaul; *sepals* creamy white, expanded, shortly ciliate, broadly ovate, obtuse, 3-veined, connate to near the middle, the dorsal sepal 2.5 mm long, 2.8 mm wide, the lateral sepals 2 mm long, 2.5 mm wide; *petals* yellow, transversely semilunate, 0.6 mm long, 1 mm wide, the apex broadly rounded, concave below a thickened margin, with a thick transverse carina, 3-veined; *lip* purple, ovoid, 0.5 mm long, 0.6 mm wide, 0.5 mm deep, concave below a thick, rounded, minimally sulcate bar, the apex rounded, thick, the dorsum slightly convex, the base truncate, hinged to the base of the column; *column* stout, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Eponymy:** Named for the department of Risaralda where the species was encountered.

This little species is characterized by flowers with broadly ovate, ciliate sepals in one or two racemes shorter than an acute, ovate leaf. The sepals were noted to be creamy white in the fresh collection with the petals yellow, and the lip purple. The petals are thick and three-veined, and the small lip is a simple type A.

**Stelis saurota** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Antioquia: Alto de Cuevas, above Nutibara, 2050 m, 4 May 1983, C. Luer, J. Luer & R. Escobar 9006 (Holotype: SEL). Fig. 38.

This large, caespitose species is characterized by two or three inflorescences with racemes longer than the leaf; glabrous sepals, the dorsal sepal antrorse, five-veined; the lateral sepals acute in apposition; three-veined petals; and an obtuse lip with a dorsal callus.

*Plant* large, epiphytic, densely caespitose; roots slender. Ramicauls erect, slender, 4–10 cm long, with a close,

tubular sheath from below the middle, and another 1–2 sheaths below and about the base; *leaf* erect, coriaceous, elliptical, acute at the tip, 6–9 cm long including a petiole 1.5–2 cm long, the blade 1.2–1.8 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 2–3; to 12 cm tall, the raceme erect, strict, secund, congested, simultaneously flowered, flowering from near the base; floral bracts tubular, acute, 3 mm long; pedicels 2 mm long; ovary 1 mm long; the peduncle less than 1 cm long, subtended by a slender spathe 1.5–2 cm long, from a node below the apex of the ramicaul; flowers light green; *sepals* glabrous, the dorsal sepal ovate, acute, with sides recurved, 4.5 mm long, 2 mm wide, 5-veined, connate basally to the synsepal, the lateral sepals ovate, acute, oblique, adherent or in apposition, with recurved margins, 4 mm long, each 2 mm wide, 3-veined; *petals* transversely ovate, 0.5 mm long, 1 mm wide, 3-veined, concave within the obtuse apex with thickened margin, with an indistinct transverse callus; *lip* green edged in black, subquadrate, 0.5 mm long, 0.6 mm wide, 0.4 mm deep, concave below the bar that is elevated centrally, minutely sulcate, the apex obtuse, the dorsum with a rounded, midline callus; the base truncate, hinged to the base of the column; *column* ca. 0.75 mm broad and long, the anther and stigmatic lobes apical.

**Etymology:** From the Greek *saurotus*, “like a lizard,” referring to the flower resembling the head of a lizard.

This large, caespitose species is characterized by slender ramicauls; acute, elliptical leaves; and two or three longer racemes of numerous, green flowers. The dorsal sepal is antrorse and connate basally to the lateral sepals; the lateral sepals are in apposition to their acute tips. The petals are three-veined. The lip is type A with an elevated, minutely sulcate bar, and with a rounded, dorsal callus.

*Stelis saurota* is similar to sympatric *Stelis lacertina* Luer & R. Escobar, the other “lizard head” described herein, but differs mostly by the dorsal sepal being connate basally and not forming a retrorse, chin-like base of the lateral sepals, and a lip with an intact, elevated bar without being widely and deeply cleft.

***Stelis scalaris*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: Bucaramanga, forest between Bucaramanga and Berlin, 2600 m, 3 November 1981, C. Luer & R. Escobar 6576 (Holotype: SEL), C. Luer illustr. 6576. Fig. 39–40.

The flowers of this species resemble those of the variable *Stelis argentata* Lindl. complex, but it differs from them by a long-repent habit and long-petiolate leaves.

*Plant* medium in size, epiphytic, long-repent, the rhizome stout, 4–5 mm thick, and 1.5–2 cm long between ramicauls. Ramicauls erect, slender, 4–7 cm long, with a tubular sheath from below the middle, another 2 sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute to subacute, 7–9 cm long including a petiole 2.5–3 cm long, the blade 1–1.5 cm wide in the dry state, cuneate below to the petiole. *Inflorescence* single; 8–13 cm long, the raceme erect, lax, distichous; floral bracts oblique, acute, 3–4 mm long; pedicels 2–3 mm long; ovary 1–2 mm long; the peduncle

2–3 cm long, subtended by a spathe 1 cm long, from a node below the apex of the ramicaul; flowers purple with white pubescence; *sepals* minutely short-pubescent, expanded, broadly ovate, obtuse, 3-veined, connate to near the middle, the dorsal sepal 4 mm long, 4 mm wide, the lateral sepals oblique, 3.25 mm long, 3.25 mm wide; *petals* transversely semilunate, 0.9 mm long, 1.25 mm wide, 3-veined, concave within a broad, thickened, apical margin, with an ill-defined transverse carina; *lip* subquadrate, 0.6 mm long, 0.8 mm wide, 0.5 mm deep, concave within the rounded apex with a minute, acute apiculum, the bar broadly rounded from the base to near the apex, shallowly sulcate with an ill-defined glenion, the dorsum microscopically pubescent, the base truncate, attached to the base of the column; *column* stout, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *scalaris*, “like a ladder,” referring to the appearance of the ramicauls spaced along a repent rhizome.

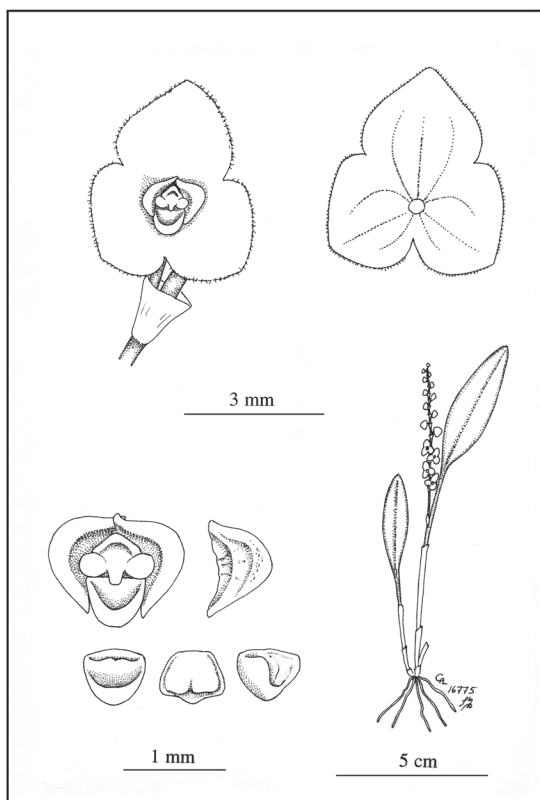
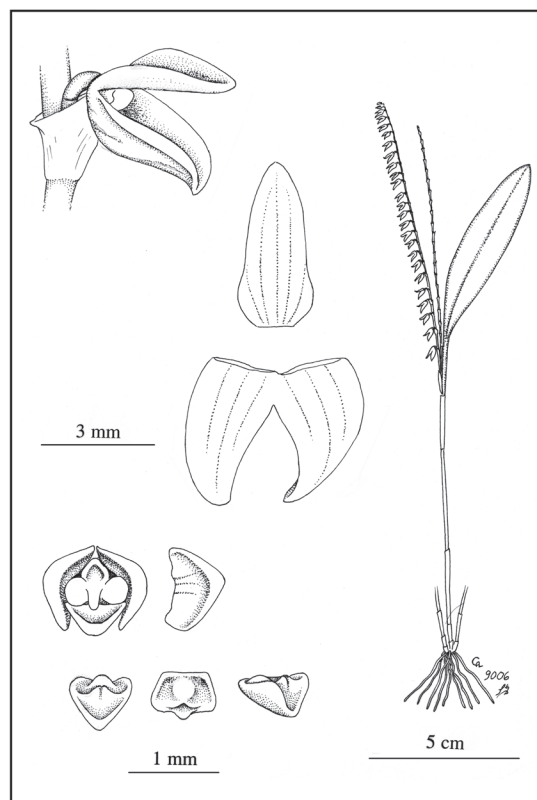
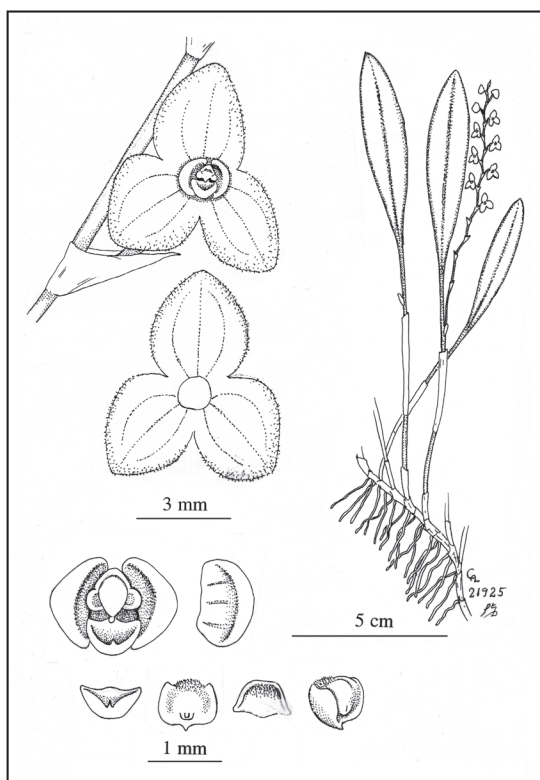
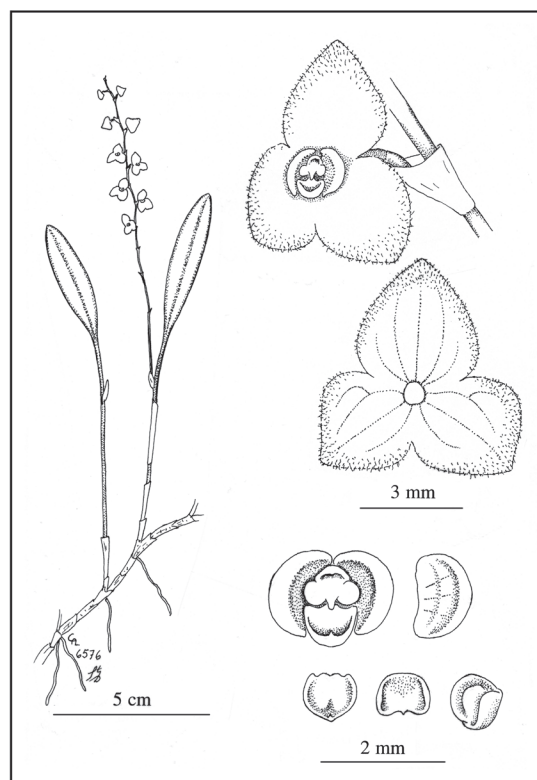
**Additional specimen examined:** COLOMBIA. Without collection data, fl. in cult. at Colomborquídeas, 9 January 1993, R. Escobar 5235 (SEL), C. Luer illustr. 21925.

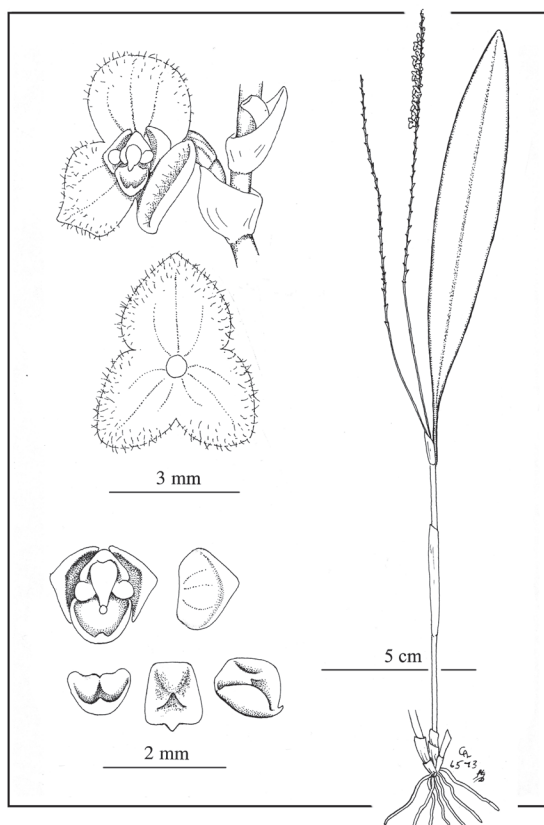
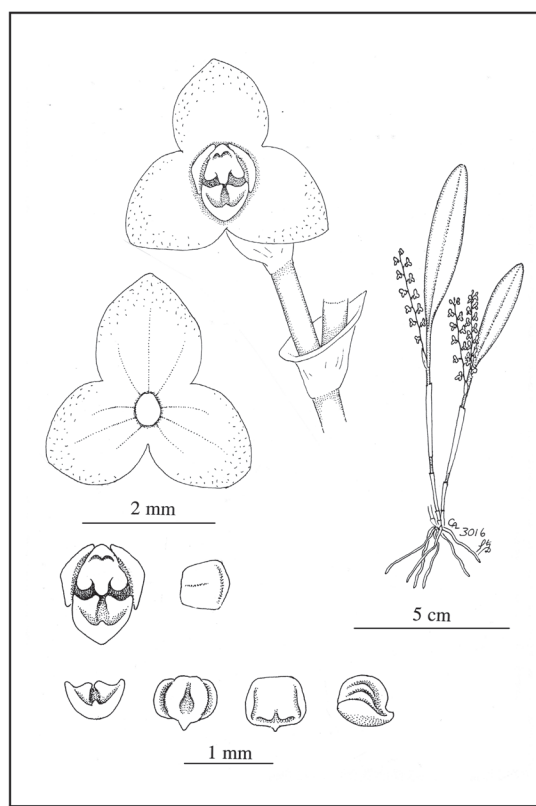
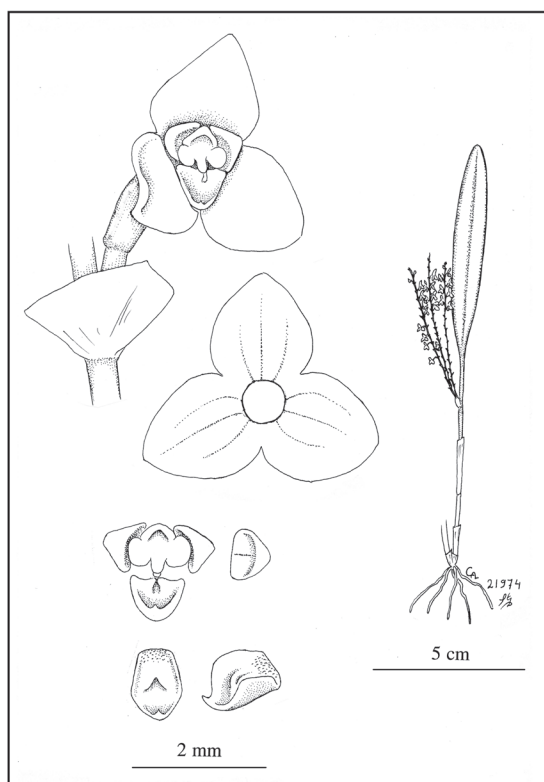
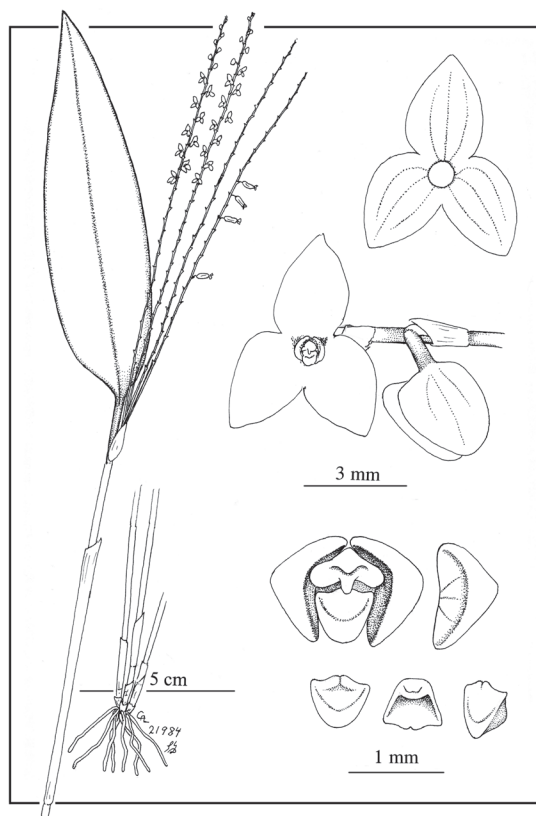
This species is characterized by a stout, creeping rhizome that gives rise to slender ramicauls that bear a loose raceme longer than long-petiolate leaves, and flowers similar to those of *Stelis argentata* Lindl. The ovate, three-veined sepals are minutely pubescent, the petals are three-veined, and the broadly obtuse, type C lip is minutely apiculate.

***Stelis secundosa*** Luer, *sp. nov.* TYPE: COLOMBIA. Without collection data, fl. in cult. by Colomborquídeas, 1 November 1981, C. Luer 6543 (Holotype: SEL). Fig. 41.

This large, caespitose species is characterized by stout ramicauls; one or two simultaneously many-flowered, secund inflorescences that exceed acute, elliptical leaves; broadly ovate, pubescent, three-veined sepals; three-veined petals; and a lip with a broadly forked bar near the center.

*Plant* large, epiphytic, caespitose; roots slender. Ramicauls erect, stout, 8–10 cm long, with a tubular sheath on the middle third, and another 2 sheaths below and about the base. *Leaf* erect, coriaceous, elliptical, acute, petiolate, 12–13 cm long including the petiole 1.5 cm long, the blade 2 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* 1–2; 15–17 cm long, the racemes erect, distichous, congested, secund, many-flowered; floral bracts oblique, acute, 2 mm long; pedicels ca. 1.75 mm long; ovary ca. 1.5 mm long; the peduncle ca. 5 cm long, with a spathe 1 mm long below the apex of the ramicaul; flowers light yellow; *sepals* pubescent, incompletely expanded, broadly ovate, subacute to obtuse, 3-veined, connate below the middle, the dorsal sepal 2.75 mm long, 2.5 mm wide, the lateral sepals 2.25 mm long, 2 mm wide; *petals* transversely ovate, concave below the thickened margin of the obtuse apex, 1 mm long, 1.25 mm wide, 3-veined; *lip* subquadrate, 1 mm long, 1 mm wide, 0.75 mm deep, concave below a thick, shallowly cleft bar near the center, the apex subtruncate with a short, triangular apiculum, the dorsum with a low, triangular callus; *column* clavate, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

FIGURE 37. *Stelis riseraldae* Luer & R. EscobarFIGURE 38. *Stelis saurota* Luer & R. EscobarFIGURE 39. *Stelis scalaris* Luer & R. EscobarFIGURE 40. *Stelis scalaris* Luer & R. Escobar

FIGURE 41. *Stelis secundosa* LuerFIGURE 42. *Stelis sobrina* Luer & R. EscobarFIGURE 43. *Stelis sobrina* Luer & R. EscobarFIGURE 44. *Stelis splendens* Luer



**Etymology:** From the Latin *secundus*, “markedly developed second,” referring to congested, overlapping flowers facing the same direction.

This large, caespitose species is distinguished by one or two very crowded, many-flowered, second racemes that equal or barely surpass a narrowly elliptical leaf. The sepals are pubescent and three-veined; the petals are also three-veined; and the lip is subquadrate and minutely apiculate with the bar low near the center and forked.

**Stelis sobrina** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Cauca: Páramo de Barbillas, SE of Popayán, 3070 m, 27 July 1978, C. Luer, J. Luer & R. Escobar 3016 (Holotype: SEL), C. Luer illustr. 3018. Fig. 42–43.

This species is distinguished by a few racemes shorter than the leaf, single-veined petals, and a lip with a shortly acuminate tip and a deep glenion.

*Plant* medium in size, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, 3.5–5 cm long, with a close, tubular sheath from below the middle and another 1–2 sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, 5–8 cm long including a petiole 1–1.5 cm long, the blade 1–1.2 cm wide in dry state, cuneate below into the petiole. *Inflorescence* 1–3 simultaneous; 2.5–4 cm long, the racemes erect, strict, congested, distichous, many-flowered with most flowers open simultaneously, floral bracts infundibular, acute, 1.5 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle ca. 1 cm long, flowering from near the base with a spathe ca. 0.5 cm long, from a node below the apex of the ramicaul; *sepals* dark red-purple externally, yellow within, microscopically pubescent, ovate, obtuse, the dorsal sepal 2 mm long, 1.5 mm wide, the lateral; *sepals* 1.5 mm long, 1.5 mm wide, 3-veined, connate below the middle; *petals* transversely obovate, concave, broadly obtuse at the apex, with the margin thickened, 0.75 mm long, 0.75 mm wide, 1-veined; *lip* subquadrate, 0.75 mm long, 1 mm wide, 0.5 mm deep, concave below a cleft bar, the apex obtuse with a short, acuminate apiculum, the dorsum slightly convex; the base truncate, hinged to the base of the column; *column* clavate, ca. 1 mm wide and long, anther and bilobed stigma apical.

**Etymology:** From the Latin *sobrina*, “a female cousin,” referring to a similarity to *Stelis polybotrya* Lindl.

**Additional specimen examined:** COLOMBIA. Cauca: Volcano of Sotará, 2800–3300 m, date unknown, F.C. Lehmann 6140 (AMES), C. Luer illustr. 21924.

With a few racemes shorter than leaf this species is similar to *Stelis polybotrya* Lindl, but differs by shorter ramicauls and leaves, proportionately longer inflorescences, and an obtuse lip that is shortly acuminate at an incurved tip.

**Stelis splendens** Luer, *sp. nov.* TYPE: COLOMBIA. Valle del Cauca: El Cairo, Cerro del Inglés, Serranía de los Paraguas, 2220 m, 30 March 1988, P.A. Silverstone-Sopkin 3784 (Holotype: MO; Isotype: CUV), C. Luer illustr. 21984. Fig. 44.

This tall, immense species is distinguished by large, ovate, acute and petiolate leaves; racemes of white flowers with ovate, acute sepals; obtuse, three-veined petals; and a

lip with the dorsum acutely deflexed.

*Plant* large, epiphytic, densely caespitose, roots slender. Ramicauls erect, slender, 20–45 cm long, with a loose, tubular sheath above the middle and another below and at the base. *Leaf* erect, coriaceous, ovate, acute, 13–15 cm long including a petiole 1.5–2 cm long, the blade 3.5–4 cm wide in dry state, contracted below into the petiole. *Inflorescence* 3–4; 13–15 cm long, the racemes erect, strict, subcongested, distichous, many-flowered; floral bracts small, oblique, acute, 2 mm long, 3 mm long near the base; pedicels 1 mm long; ovary 1 mm long; the peduncle 3–4 cm long, with a spathe 1–1.5 cm long, from a node below the apex of the ramicaul; flowers white; *sepals* glabrous, ovate, acute, 3-veined, connate near the base, the dorsal sepal 3.5 mm long, 2.5 mm wide, the lateral sepals 3 mm long, 2.5 mm wide; *petals* transversely ovate, obtuse, concave, below the thickened apical margin, 0.6 mm long, 1 mm wide, 3-veined; *lip* subtriangular, 0.5 mm long, 0.6 mm wide, 0.3 mm deep, shallowly concave below a narrow, notched bar, the apex obtuse with a broad margin, the dorsum acutely deflexed, concave above a rounded basal callus, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.8 mm wide and long, anther and bilobed stigma apical.

**Etymology:** From the Latin *splendens*, “splendid,” referring to the floral and vegetative characters.

This tall, immense species is distinguished by white flowers borne in several racemes that more or less equal in length a large, ovate, acute and petiolate leaf. The ovate, acute sepals and the obtuse petals are three-veined. The dorsum of the lip, similar to that of *Stelis bigibba* Schltr., is acutely deflexed leaving the bar as a narrow edge between the sides of the lip.

**Stelis stigmatosa** Luer & R. Escobar, *sp. nov.* COLOMBIA. Without collection data, fl. in cult. by the Robledos at La Ceja, 22 November 1981, C. Luer 6745 (Holotype: SEL). Fig. 45.

This caespitose species is characterized by a lax, relatively large-flowered raceme that exceeds a narrow, long-petiolate leaf; three-veined, obtuse, densely pubescent sepals with recurved margins; three-veined petals; a lip with the bar thick and rounded; and a stigma with expanded, oblique lobes confluent beneath the rostellum.

*Plant* medium in size, epiphytic, densely caespitose. Ramicauls erect, slender, 3–4 cm long, with a tubular sheath from below the middle and 1–2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, subacute to obtuse, 7–10 cm long including a slender petiole 2–4 cm long, the blade 0.8–1 cm wide in the dry state, narrowed below to the petiole. *Inflorescence* single; 12–13 cm long, the raceme erect, lax, distichous, many-flowered; floral bracts oblique, acute, 5 mm long; pedicels 5 mm long; ovary 2 mm long; the peduncle 1.5–2.5 cm long, subtended by a spathe 7–9 mm long, from a node below the apex of the ramicaul; *sepals* greenish white with a dense, white pubescence, ovate, obtuse with recurved margins, 3-veined, connate below the middle, the dorsal sepal 4.5 mm long, 4 mm wide, the lateral sepals oblique, 3.5 mm long, 4 mm wide; *petals* transversely elliptical, 1 mm long, 2 mm wide, 3-veined, concave below

a thick, rounded apex, without a transverse carina; *lip* type C, subquadrate, 1.3 mm long, 1.3 mm wide, 0.8 mm deep, the bar a smooth, thick, rounded callus extending from near the middle of the posterior surface, where it is hinged to the column, to below the middle of the anterior surface, concave within the rounded apex with a short, obtuse apiculum; *column* stout, ca. 1.5 mm long and wide, the anther and the stigmatic lobes apical, the stigmatic lobes oblique, expanded, confluent beneath the rostellum.

**Etymology:** From the Latin *stigmatosus*, "with remarkable stigma," referring to the expanded, oblique, stigma lobes.

The habit of this species is similar to that of many: medium sized; a lax raceme exceeding narrow leaves; three-veined, pubescent sepals; and three-veined petals. The lip is type C lip with an apiculum, although it differs with the bar being replaced by a smooth, rounded callus that extends from the middle of the back surface to the middle of a front surface. It also differs with oblique, expanded stigma lobes that are confluent beneath the rostellum.

**Stelis stolonifera** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: E of La Victoria, 3000–3200 m, 4 November 1979, C. Luer, J. Luer & A. Hirtz 4642 (Holotype: SEL). Fig. 46.

This medium-sized to large species is noted for a branching, prolific habit; one or two long, congested, many-flowered racemes; subacute, three-veined sepals; deeply inflated, thin-walled, semiorbicular petals; and an obtuse lip concave below a retuse bar.

**Plant** medium-sized to large, epiphytic, branching, prolific; roots slender. Ramicauls erect, stout, producing another ramicaul at the apex, 3–4 cm long above, to 12 or more cm long below with a tubular, fugacious sheath from near the base, and another at the base. **Leaf** erect, coriaceous, elliptical, acute, 4–6 cm long including a petiole ca. 5 cm long, the blade 1–1.5 cm wide in the dry state, cuneate below into the petiole. **Inflorescence** 1–2; 5–14 cm long, the raceme erect, strict, subflexuous, distichous, flowering from the base; floral bracts inflated, oblique, 2.5 mm long; pedicels 1.5 mm long; ovary 1.5 mm long; the peduncle nil, subtended by a thin spathe ca. 5 mm long, from the apex of the ramicaul; flowers yellow; **sepals** unexpanded, glabrous, ovate, subacute, three-veined, the dorsal sepal 3 mm long, 2.5 mm wide, the lateral sepals antrorse, 3 mm long, 2.25 mm wide; **petals** deeply concave, inflated, thin-walled, semiorbicular, 1 mm long, 1 mm wide, 1-veined; **lip** subquadrate, 1 mm long, 0.8 mm wide, 0.6 mm deep, concave below a retuse bar, the apex obtuse, the dorsum smooth, slightly convex, the base truncate, hinged to the base of the column; **column** stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *stolonifer*, "branch bearing," referring to the prolific habit.

This species is remarkable for the prolific habit of forming plantlets as it ascends. In addition to another ramicaul, one or two congested racemes are produced from the apex of the ramicaul. The sepals are non-spreading with the laterals antrorse. The petals are inflated into hemispheres. The lip is type A.

**Stelis uncinula** Luer & Hirtz, *sp. nov.* TYPE: COLOMBIA. Nariño: SE of Ipiales toward La Victoria, 3800 m, 22 February 1978, C. Luer, J. Luer & A. Hirtz 2706 (Holotype: SEL). Fig. 47.

This small, densely caespitose-ascending species is characterized by a second raceme much longer than elliptical leaves; shorter ramicauls clad in loose, tubular sheaths; broad, three-veined sepals; three-veined petals; and a rounded lip with a "U"-shaped callus.

**Plant** small, epiphytic, densely caespitose-ascending; roots slender. Ramicauls ascending, erect, stout, 2–3 cm long, enclosed by loose, imbricating, tubular sheaths, one from near the middle, another below the middle, and another about the base. **Leaf** erect, coriaceous, elliptical, subacute, 3–4.5 cm long, 0.8–1 cm wide in the dry state, narrowed below into an ill-defined petiole less than 1 cm long. **Inflorescence** solitary; 8–11 cm tall, the raceme strict, erect, congested, second, many-flowered with many flowers open simultaneously, the peduncle 5–6 cm long, subtended by a slender spathe 1 cm long, from a node below the apex of the ramicaul; floral bracts erect, tubular, acute, 2 mm long; pedicels 2–2.5 mm long; ovary 1 mm long; flowers dull red; **sepals** similar, diffusely studded with enlarged cells, broadly ovate, obtuse, connate to near the middle, 2 mm long, 2 mm wide, 3-veined; **petals** transversely oblong, concave, broadly rounded at the apex, the margin narrowly thickened, 1 mm long, 1.25 mm wide, 3-veined; **lip** subquadrate, 1 mm long, 1.2 mm wide, 0.6 mm deep, concave within the thin, rounded margin, surrounding an elevated horseshoe-shaped callus that descends from the dorsum, the dorsum slightly convex, microscopically pubescent above the base, the base broadly truncate, hinged to the base of the column; **column** stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

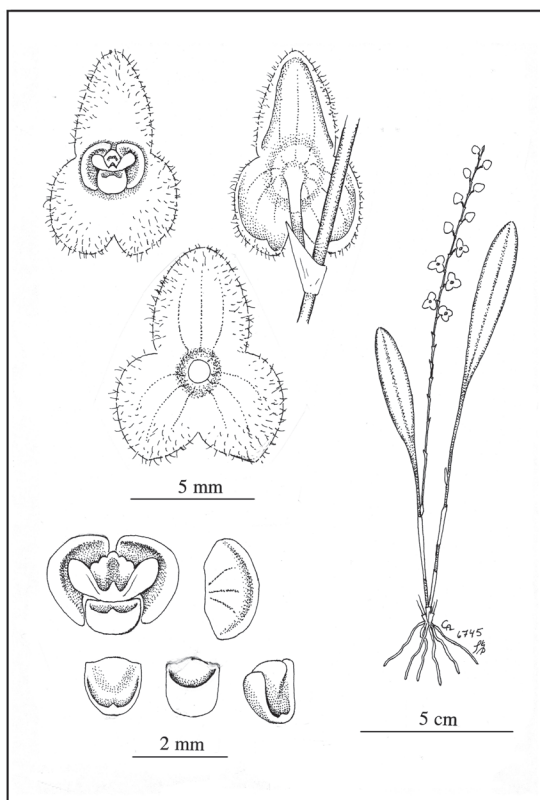
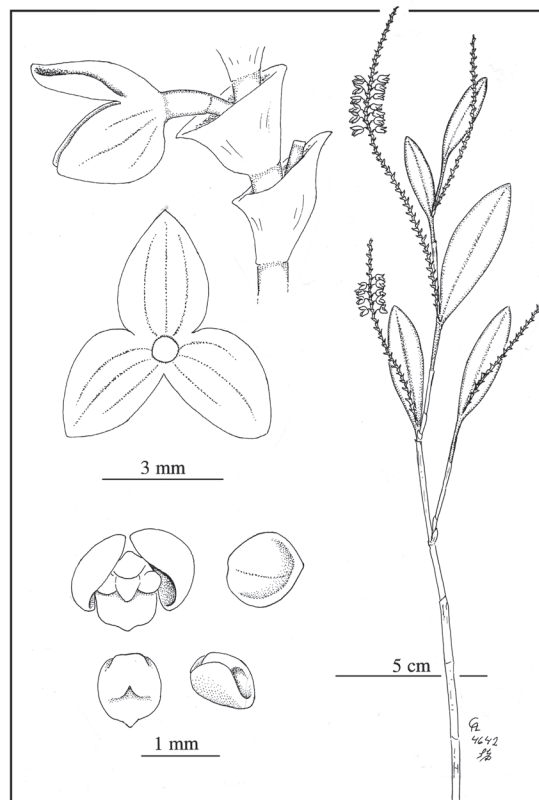
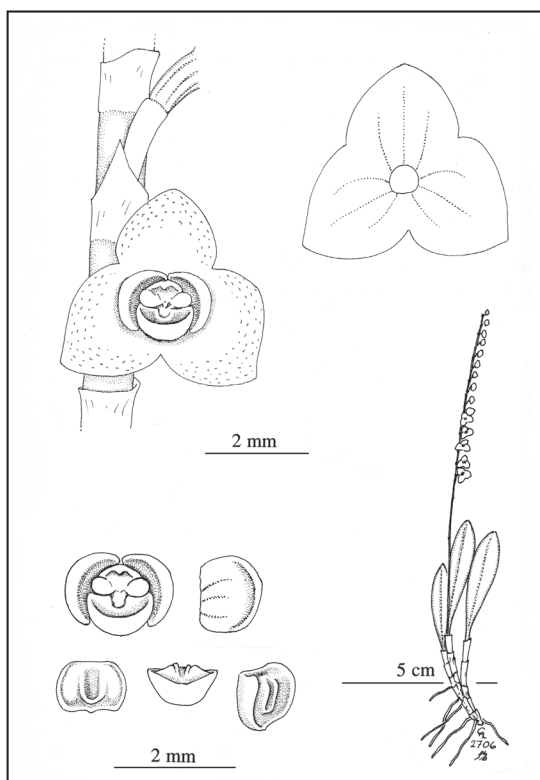
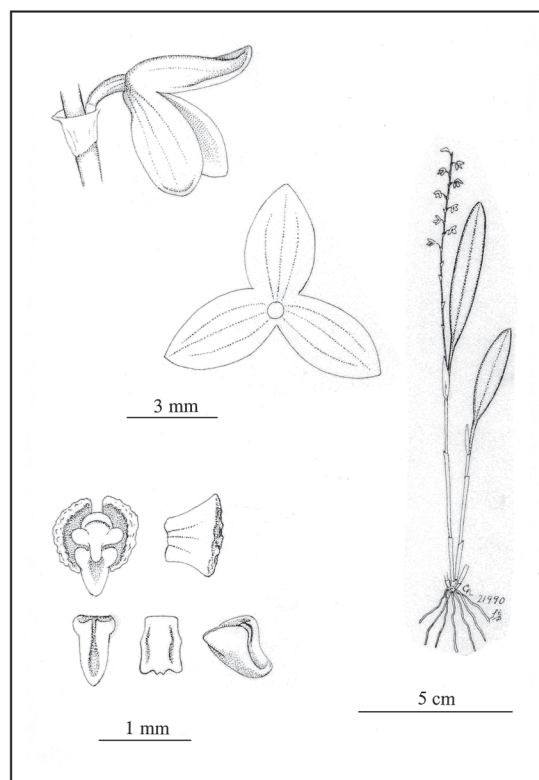
**Etymology:** Named for the similarity of the labellar callus to the letter "U."

This small, densely caespitose-ascending species is characterized by an ascending ramicaul clothed by loose, imbricating sheaths, and a raceme borne by a peduncle longer than the leaf. The sepals are broad and deeply connate. *Stelis uncinula* is one of several that are distinguished by a horseshoe-shaped callus on the lip. This callus is a modified glenion with thickened margins that descends from the bar to within the rounded apex. Other species with a similar, "U-shaped," labellar callus are *S. decipula* Luer & R. Escobar and *S. hippocrepica* Luer & R. Escobar.

**Stelis vanescens** Luer, *sp. nov.* TYPE: COLOMBIA. Chocó: San José del Palmar, Cerro Torrá, above heliport, 1920–1950 m, 8 Aug. 1988, P.A. Silverstone-Sopkin 4150 (Holotype: MO; Isotype: CUVC), C. Luer illustr. 21990. Fig. 48.

This caespitose species is characterized by a sublux raceme; elliptical, three-veined sepals; cuneate petals with a truncate, roughened apex; and a lip with a narrow glenion thickened sides.

**Plant** medium in size, epiphytic, densely caespitose; roots slender. Ramicauls slender, 4–7 cm long, enclosed by a tubular sheath from below the middle and another sheath

FIGURE 45. *Stelis stigmatosa* Luer & R. EscobarFIGURE 46. *Stelis stolonifera* Luer & HirtzFIGURE 47. *Stelis uncinula* Luer & HirtzFIGURE 48. *Stelis vanescens* Luer

below and at the base. *Leaf* erect, coriaceous, narrowly elliptical, acute, petiolate, 4.5–7 cm long, 0.7–1 cm wide in dry state, contracted below into a slender petiole 1.5–2 cm long. *Inflorescence* 1–2, 7–10 cm long, the raceme erect, subclax, strict, distichous; floral bracts oblique, acute, 1.5 mm long; pedicels 1.5 mm long; ovary 1.5 mm long; peduncle 1–2 cm long, subtended by a spathe 12–15 mm long, from a node below the apex of the ramicaul; flowers yellow; *sepals* glabrous, similar, elliptical, acute, 4 mm long, 2.5 mm wide, 3-veined, connate basally; *petals* cuneate, 0.5 mm long, 1 mm wide, 3-veined, the apex broadly truncate with a thickened, irregular margin, shallowly concave; *lip* subovoid, 0.8 mm long, 0.5 mm wide, 0.5 mm deep, concave below a bar that is shallowly cleft between a pair of thickened margins of a narrow, descending glenion, the apex obtuse without thickened margins, the base slightly convex, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.5 mm wide and long, the anther and bilobed stigma apical.

**Etymology:** From the Latin *vanescens*, “disappearing,” referring to the difficulty in finding a lip.

This caespitose species is characterized by a subclax raceme of middle-sized flowers; elliptical, three-veined sepals; cuneate, truncate petals; and an elusive lip. The flowers hydrate poorly, but only two lips were recovered from over a dozen flowers examined.

***Stelis variola*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Norte de Santander, Páramo de Jurisdicciones, 2600 m, collected 10 November 1981, fl. in cult. at Selby Gardens 81-2647, 10 February 1982, C. Luer, J. Luer & R. Escobar 6825 (Holotype: SEL). Fig. 49.

This medium-sized, caespitose species is characterized by a distichous raceme; elliptical leaves; glabrous, three-veined sepals with irregular, scattered particles of an unidentified substance; semilunate, three-veined petals with nodular margins; and an obtuse, subquadrate lip.

*Plant* medium-sized, epiphytic, caespitose; roots slender. Ramicauls erect, slender, 3–5 cm long, with a tubular sheath from below the middle, and another sheath below at the base. *Leaf* erect, coriaceous, elliptical, obtuse, 8–10 cm long including a petiole 2–2.5 cm long, the blade 1.75–2 cm wide in the dry state, cuneate below into the petiole. *Inflorescence* single; 10 cm long, the raceme erect, strict, subflexuous, distichous; floral bracts inflated, oblique, 2 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle ca. 2 cm long, subtended by a spathe 1 cm long, from a node below the apex of the ramicaul; flowers light yellow; *sepals* expanded, glabrous, with scattered, minute, irregular deposits of an unidentified substance, elliptical, ovate, subacute to obtuse, three-veined, free to near the base, the dorsal sepal 3 mm long, 1.8 mm wide, the lateral sepals 2 mm long, 1.5 mm wide; *petals* transversely semilunate, 0.6 mm long, 1 mm wide, 3-veined, concave within the rounded apex with a narrow, more or less nodular margin, without a transverse carina; *lip* subquadrate, 0.6 mm long, 0.6 mm wide, 0.5 mm deep, concave below a thick, retuse bar, the apex obtuse, the dorsum smooth, convex, the base truncate,

hinged to the base of the column; *column* stout, ca. 0.6 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** Named for smallpox, the viral disease manifested by multiple, irregular, cutaneous lesions, referring to the unidentified substance seen in the sepals.

This medium-sized, caespitose species is another distinguished by a minute, irregular substance scattered within the sepals. The small flowers are borne in a distichous raceme about as long as obtuse leaves; the sepals are elliptical and free to near the base; and the petals are semilunate and concave with a more or less nodular margin. The tiny lip is type A with a thick, retuse bar.

***Stelis verruculosa*** Luer & R. Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: forest between Santa Barbara and Guaca, 2700 m, 6 November 1981, C. Luer & R. Escobar 6602 (Holotype: SEL). Fig. 50.

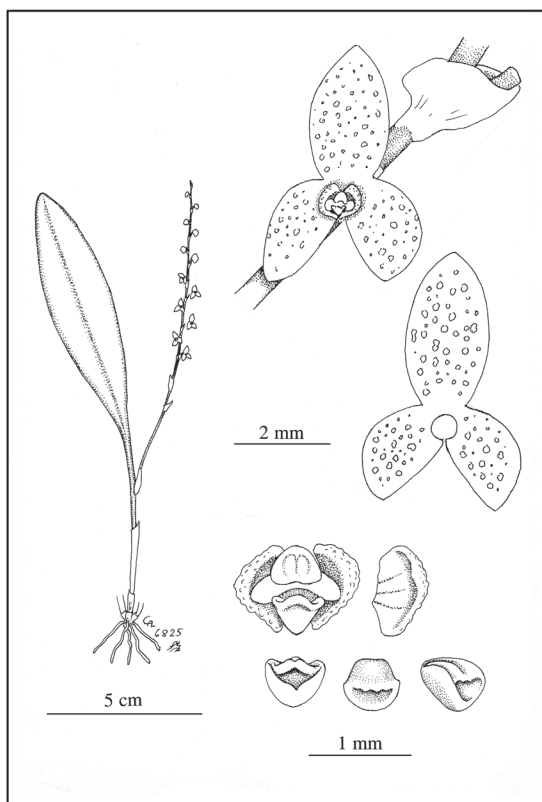
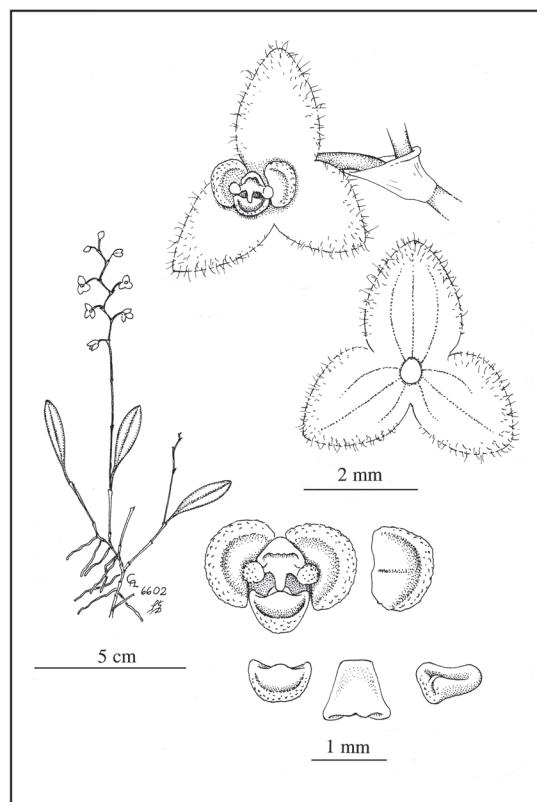
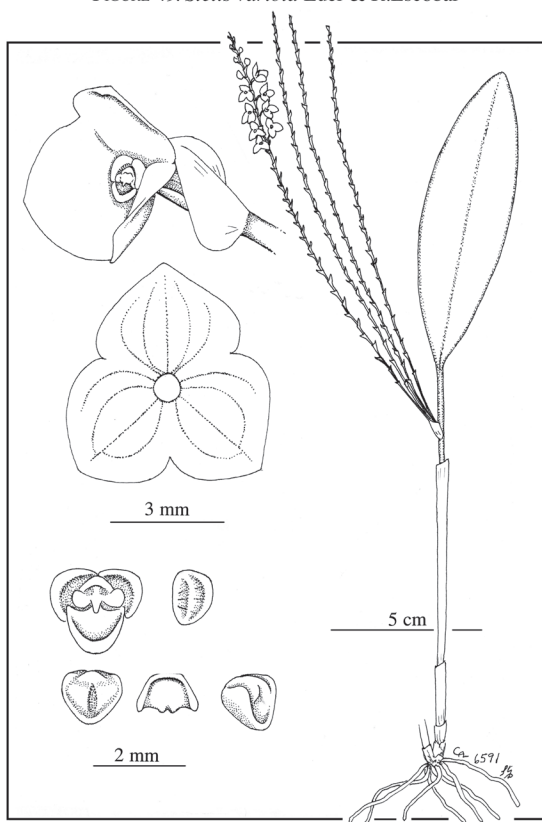
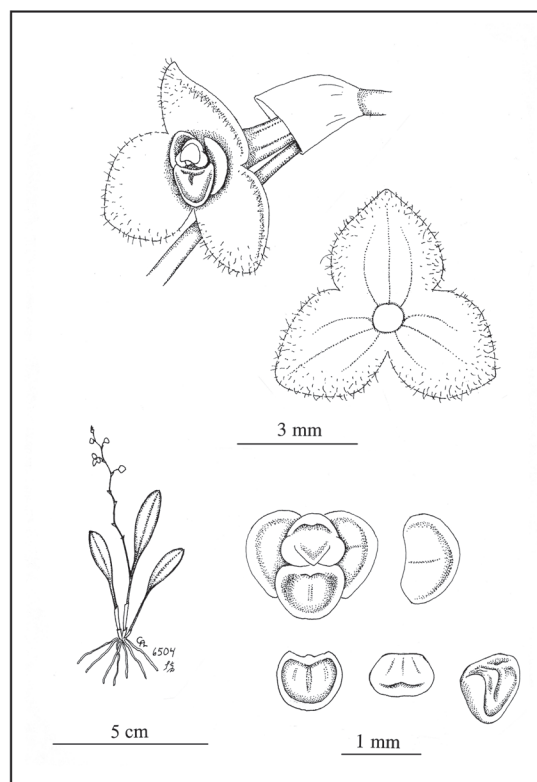
This small, repent species is distinguished by a flexuous, successively flowered inflorescence about twice as long as the leaf; ovate, pubescent, three-veined sepals; thick, concave, single-veined petals with the thickened margin minutely verrucose; a subquadrate lip with a similar margin; and pedunculate, microscopically verrucose stigmatic lobes.

*Plant* small, epiphytic, repent, the rhizomes thin, 0.5–1 cm between ramicauls. Ramicauls erect, slender, 1.5–2.5 cm long, with a tubular sheath from below the middle, and another 1–2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 2–3.5 cm long including a petiole 5.0–8.0 cm long, the blade 0.5–0.7 cm wide in the dry state, cuneate below to the petiole. *Inflorescence* single; 5–8 cm long, the raceme erect, loose, flexuous, successively fewer than 10-flowered; floral bracts oblique, acute, 1.5 mm long; pedicels 2 mm long; ovary 1.25 mm long; the peduncle 3–5 cm long, from a node below the apex of the ramicaul; flowers purple, the pubescence white; *sepals* pubescent, expanded, ovate, subacute, 3-veined, connate below the middle, the dorsal sepal 2.5 mm long, 2 mm wide, the lateral sepals 2 mm long, 1.8 mm wide; *petals* thick, transversely ovate, 0.8 mm long, 1 mm wide, 1-veined, concave below a thickened, verrucose margin of the rounded apex; *lip* subquadrate, 0.5 mm long, 0.8 mm wide, 0.8 mm deep, concave below a rounded bar, the apex rounded with thickened, verrucose margin, the base truncate, hinged to the base of the column; *column* clavate, ca. 1 mm long and wide, the anther and the pedunculate, microscopically verrucose stigmatic lobes apical.

**Etymology:** From the Latin *verruculosus*, “minutely verrucose,” referring to the minutely verrucose, thickened margins of the petals and lip as well as the pedunculate stigmatic lobes.

This small, repent species forms tangled clusters; a delicate, flexuous, successively flowered raceme exceeds the leaves; and the purple sepals are covered with a fine, white pubescence. The rounded, single-veined petals are proportionately large with a thickened, verrucose margin. The lip is deep and short with a broad, similarly verrucose margin. The stigmatic lobes are pedunculate and microscopically verrucose.



FIGURE 49. *Stelis variola* Luer & R. EscobarFIGURE 50. *Stelis verruculosa* Luer & R. EscobarFIGURE 51. *Stelis vigoris* Luer & R. EscobarFIGURE 52. *Stelis zelleri* Luer

**Stelis vigoris** Luer & R.Escobar, *sp. nov.* TYPE: COLOMBIA. Santander: terrestrial on road embankment between Santa Barbara and Guaca, 2400 m, 6 November 1981, C. Luer & R. Escobar 6591 (Holotype: SEL). Fig. 51.

This large, caespitose species is characterized by robust ramicauls; a small spathe with a fascicle of up to seven many-flowered racemes that exceed a large, elliptical leaf; transverse, obtuse, deeply connate sepals, the dorsal being five-veined; three-veined petals; and an obtuse, type A lip.

*Plant* large, epiphytic, densely caespitose. Ramicauls erect, stout, 12–15 cm long, with a loose tubular sheath from below the middle, another 2–3 tubular sheaths below at the base. *Leaf* erect, coriaceous, elliptical, subacute, 10–12 cm long including a petiole 1.5 cm long, the blade 3–3.5 cm wide in the dry state, cuneate below to the petiole. *Inflorescence* up to 7 simultaneous; 20–25 cm long, the racemes erect, congested, distichous, many-flowered; floral bracts oblique, subacute, inflated 4 mm long; pedicels 2 mm long; ovary 1.5 mm long; the peduncle 3–7 cm long, subtended by a spathe 4–5 mm long, from a node below the apex of the ramicaul; *sepals* purple, light purple within, glabrous, not widely expanded, transversely ovate, obtuse, connate to near the middle, the dorsal sepal 3 mm long, 4.5 mm wide, 5-veined, the lateral sepals 3.5 mm long, 4.5 mm wide, 4-veined; *petals* yellow, transversely ovate, 1.5 mm long, 1.75 mm wide, 3-veined, concave below a thick, rounded apex, with a transverse carina; *lip* yellow, type A, subquadrate, 1 mm long, 1.3 mm wide, 0.8 mm deep, concave below a sulcate bar with a glenion, the apex rounded, the dorsum low, convex, the base truncate, hinged to the base of the column; *column* stout, ca. 1 mm long and wide, the anther and the stigmatic lobes apical.

**Etymology:** From the Latin *vigoris*, “vigorous,” referring to the robust habit with the inflorescence fasciculate with many-flowered racemes.

This large, robust, caespitose species is characterized by stout ramicauls that bear a large, elliptical leaf. One or up to seven many-flowered racemes are produced simultaneously with a proportionately small spathe. The sepals are broad, obtuse and deeply connate into an incompletely expanded flower. The three-veined sepals and the type A lip are not unusual.

**Stelis zelleri** Luer, *sp. nov.* TYPE: COLOMBIA. Risaralda: Pueblo Rico, 1800–2000 m, collected 20 July 1980, and fl. in cult. near Ulm, Germany, 20 September 1981, by Ernst Zeller *s.n.*, C. Luer 6504 (Holotype: SEL). Fig. 52.

This small, caespitose species is distinguished by a flexuous, successively flowered inflorescence about twice as long as the leaf; ovate, pubescent, three-veined sepals; concave, single-veined petals with a thin margin; and a subcircular lip similar to the petals.

*Plant* small, epiphytic, caespitose. Ramicauls erect, slender, 2–2.5 cm long, with a tubular sheath from below the middle, and another 1–2 tubular sheaths below and at the base. *Leaf* erect, coriaceous, elliptical, acute, 2–3.5 cm long including a petiole less than 1 cm long, the blade 0.5–0.7 cm wide in the dry state, cuneate below to the petiole. *Inflorescence* single; 5 cm long, the raceme erect, loose, flexuous, successively flowered; floral bracts oblique, acute, 2 mm long; pedicels 1 mm long; ovary 1 mm long; the peduncle 1–1.5 cm long, from a node below the apex of the ramicaul; flowers light green, the pubescence white; *sepals* pubescent, expanded, similar, ovate, subacute to obtuse, 2.5 mm long and wide, 3-veined, connate below the middle; *petals* green with purple margins, semicircular, 0.8 mm long, 1.2 mm wide, 1-veined, concave below the thin, margin of the rounded apex; *lip* subquadrate, 0.8 mm long, 0.8 mm wide, 0.5 mm deep, shallowly concave below a rounded bar, 3-veined, the apex rounded with a thin margin, the base truncate, hinged to the base of the column; *column* clavate, ca. 0.8 mm long and wide, the anther and the stigmatic lobes apical.

**Eponymy:** Named for Ernst Zeller of Ulm, Germany, who collected and cultivated this species.

This small, caespitose species from the Central Cordillera has many features similar to *Stelis verruculosa* Luer & R.Escobar, a repent species from the Eastern Cordillera. Both share a flexuous, successively flowered raceme of superficially similar flowers with pubescent sepals, but differing markedly in morphology of the petals, lip and column. The lip of *Stelis zelleri* resembles the petals with a narrowly margined, rounded apex.

#### LITERATURE CITED

- Luer, C. A. 2016a. *Icones Stelidarum (Orchidaceae) Colombiae*. Harvard Papers in Botany 21, No. 1: 59–92.  
 ———. 2016b. *Icones Stelidarum (Orchidaceae) Colombiae* II. Harvard Papers in Botany 21, No. 2: 193–225.  
 ———. 2017. *Icones Stelidarum (Orchidaceae) Colombiae* III. Harvard Papers in Botany 22, No. 1: 27–60.

#### APPENDIX

##### CORRIGENDA FOR *ICONES STELIDARUM (ORCHIDACEAE) COLOMBIAE* III (LUER, 2017)

*Stelis amaliana* Luer

Replaced synonym: *Stelis amaliae* Luer & R. Escobar, Harvard Pap. Bot. 22(1): 27. 2017, *non Stelis amaliae* (Luer & R.Escobar) Pridgeon & M.W.Chase, 2001.

*Stelis attenuata* Lindl., Folia Orch., *Stelis* 2. 1858.

Synonyms: *Stelis eumeces* Luer & Hirtz, Monogr. Syst. Bot. Missouri Bot Gard. 112: 251. 2007.

*Stelis dinamica* Luer & R.Escobar, Harvard Pap. Bot. 22(1): 36. 2017.

*Stelis dispar* C.Schweinf., Fieldiana Bot., 28: 177. 1958.

Synonym: *Stelis dendrophila* Luer & R.Escobar, Harvard Pap. Bot. 22(1): 34. 2017.

*Stelis escobarii* Luer

Replaced Synonym: *Stelis rodrigo* Luer, Harvard Pap. Bot. 22(1): 85. 2017, *non Stelis rodrigo* (Luer) Pridgeon & M.W.Chase, 2001.

*Stelis eucalypta* Luer, Harvard Pap. Bot. 22(1): 39. 2017, *nom. superfl.*

The author overlooked *Stelis alloinfundibulosa* J.M.H.Shaw Orchid Rev. 122: 77 (2014) had already been published to replace *Stelis infundibulosa* Luer.

*Stelis oscar* Luer

Replaced synonym: *Stelis duquei* Luer, Harvard Pap. Bot. 22, 1: 64. 2017, *non Stelis duquei* P.Ortíz, 2011.

*Stelis sesquipedalis* Lindl., Orch. Lind. 3. 1846.

Synonym: *Stelis ephippium* Luer & R.Escobar, Harvard Pap. Bot. 22(1): 39. 2017.

*Stelis volcani* Rehb.f., Otia Bot. Hamburg. 1: 19. 1878.

Synonym: *Stelis inedita* Luer & R.Escobar, Harvard Pap. Bot. 22(1): 48. 2017.

# NEOCAPPARIS: GENERIC STATUS AND NEW NAME FOR CAPPARIDASTRUM SUBGENUS PACHYCARPUM (CAPPARACEAE)

XAVIER CORNEJO<sup>1</sup>

**Abstract.** Based on morphological characters and recent molecular evidence, *Capparidastrum* subgenus *Pachycarpum* (Capparaceae) is raised to generic status. As *Pachycarpus* is a previous and valid generic name of Apocynaceae (Asclepiadoideae), *Neocapparis* is here proposed as a new generic name for *Capparidastrum* subgenus *Pachycarpum*. Two new combinations for species previously placed in *Capparidastrum* are presented here: *Neocapparis pachaca* and *Neocapparis quina*. The new genus is restricted to Neotropical dry forests, ranging from Mexico to northern Colombia and Venezuela and disjunct to western Ecuador and Peru. Illustrations of species and full citation of collections are provided.

**Resumen.** *Capparidastrum* subgenus *Pachycarpum* (Capparaceae) se eleva a rango de género basado en caracteres morfológicos y evidencia molecular reciente. Como *Pachycarpus* es un género válido de Apocynaceae (Asclepiadoideae), se propone *Neocapparis* como un nombre genérico nuevo para *Capparidastrum* subgénero *Pachycarpum*. Se proponen dos nuevas combinaciones para especies previamente en *Capparidastrum*: *Neocapparis pachaca* y *Neocapparis quina*. El género nuevo está restringido a los bosques secos del Neotrópico, desde Méjico hasta el norte de Colombia y Venezuela, y en la costa de Ecuador y Perú. Se proveen ilustraciones de las especies y se citan las colecciones estudiadas.

**Keywords:** Capparaceae, *Capparidastrum* subgenus *Pachycarpum*, dry forests, *Neocapparis*, Neotropics

The New World species formerly placed in *Capparis* L. s.l. (Capparaceae) were split into 16 distinct genera based on morphological characters; keys for identification also were presented for the nine reinstated and seven newly proposed genera (Cornejo and Iltis, 2006, 2008a,b,c,d, 2009a,b; Iltis and Cornejo, 2007, 2010, 2011). Subsequently, phylogenetic studies support most of the generic realignment, with the exception of *Capparidastrum* (DC.) Hutch., which is polyphyletic (Briceño et al., 2015; Cardinal-McTeague et al., 2016). When *Capparidastrum* was reinstated, the morphological diversity fit into three subgenera: *Capparidastrum* subgenus *Capparidastrum* (two species), *C.* subgenus *Pulviniglans* Cornejo & H. H. Iltis (15 species) and *C.* subgenus *Pachycarpum* Cornejo & H. H. Iltis (two species) (Cornejo and Iltis, 2008a). Among the comprised species, *C. pachaca* (Kunth) Hutch., the type of *C.* subgenus *Pachycarpum*, is placed in a small clade among two morphologically different genera as the South American *Preslianthus* H. H. Iltis & Cornejo and *Anisocapparis* Cornejo & H. H. Iltis (Cardinal-McTeague et al., 2016). As that clade is located in a rather distant position from *C. frondosum*, that is, the type of *Capparidastrum*, the phylogenetic results suggest that *C.* subgenus *Pachycarpum* deserves a generic status. However, *Pachycarpus* E. Mey (1837), derived from the Greek prefix *pachy* (stout), and the Greek *karpos* (fruit), is already occupied (*Pachycarpus* E. Mey., Apocynaceae, Asclepiadoideae), and a new name is required, which is proposed as follows.

**Neocapparis** Cornejo, *nom. et stat. nov.* Fig. 1.

Basionym: *Capparidastrum* subgen. *Pachycarpum* Cornejo & H. H. Iltis, Harvard Pap. Bot. 13(2):235, non *Pachycarpus* E. Mey. 2008. TYPE: *Capparis pachaca* Kunth.

Many branched *trees*. Terminal branches, buds and young petioles with very short unbranched trichomes, otherwise glabrous. Leaves spirally arranged, simple, tertiary nerves densely reticulate arranged on both sides; petioles of similar sizes, relatively short. Calyx 1-seriate, distinctively shorter than corolla; petals imbricate in bud, erect or suberect at anthesis, hypanthium often present, floral nectaries flattened or/to scales; stamens 30–63, spirally arranged before anthesis; ovary spherical, ovoid or broadly elliptic; stigma capitate, sessile; fruits spherical amphisarca, seeds surrounded by a sarcotesta of infiltrated hairs, embryo white or cream, the cotyledons convoluted one into the other and around the radicle. It comprises two species.

**Etymology:** The epithet is derived from the Greek prefix *neo-*, “new,” and *Capparis*, the former generic name of this taxon. It also refers to the Neotropical pattern of distribution of this interesting genus of Capparaceae.

**Distribution:** dry forests, southern Mexico (Oaxaca, Guerrero) to coastal northern Colombia and Venezuela, and disjunct to coastal Ecuador and Peru.

Among Neotropical Capparaceae, *Neocapparis* is characterized by the simple hairs on terminal branches and inflorescences, which are otherwise glabrous; leaves spirally arranged, blades with densely reticulate nerves, petioles of similar sizes; calyx 1-seriate, valvate, distinctively shorter than corolla, floral nectaries flattened or/to scales; amphisarcous fruits and seeds with cotyledons convoluted. The new genus shares with *Preslianthus* Iltis & Cornejo the phyllotaxy, petioles of even length, number and shape of floral nectaries, those flattened, fruits amphisarcous, seeds covered by a sarcotesta of infiltrated hairs, embryo white and cotyledons convoluted, but *Neocapparis* sharply differs from the later by the simple trichomes or absence of indumentum (versus delicate stellate-tufted), and flowers

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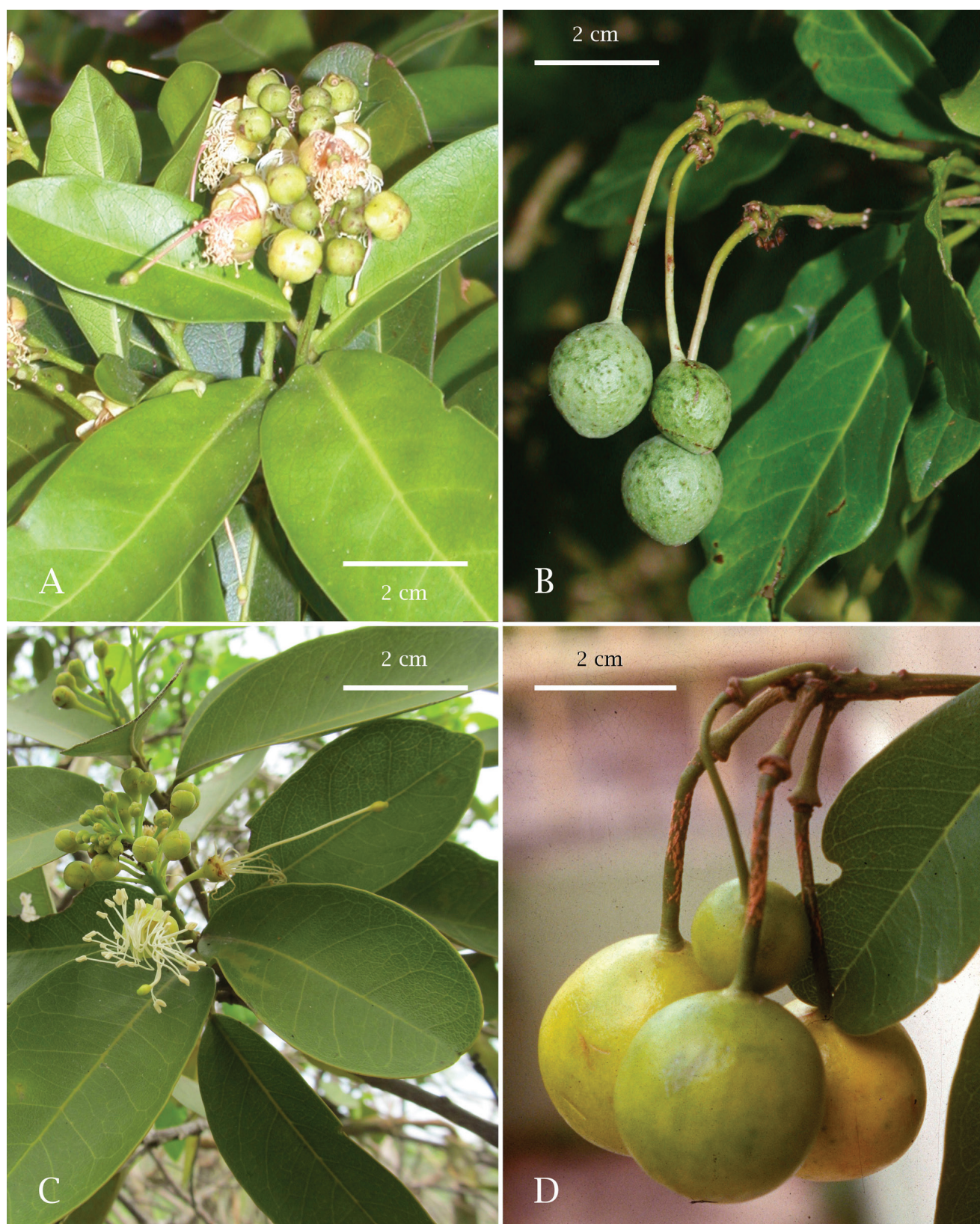


FIGURE 1. A–B, *Neocapparis pachaca* (J. F. Macbr.) Cornejo, C–D, *N. quina* (J. F. Macbr.) Cornejo. A, Terminal leafy branches and inflorescences; B, Infructescence with immature fruits; C, Terminal leafy branches and inflorescences; D, Infructescence with mature fruits. A–B courtesy of Francisco Morales, from Punta Descartes, on the Pacific coast of Costa Rica near the Nicaraguan border; C courtesy of Deirdre Platt, from Manabí, coastal Ecuador.



with stamens never accrescent just before anthesis (versus flowers with stamens conspicuously accrescent just before anthesis; Iltis & Cornejo, 2011). *Neocapparis* shares with *Anisocapparis* the type of indument, phyllotaxy, petioles of even length and number of floral nectaries. However, *Neocapparis* sharply differs from the latter by the calyx isosepalous (versus anisosepalous), floral nectaries of similar shape and size (versus strongly dimorphic), fruit

amphisarcous (versus pepo), and seeds cochleate (versus globose) with cotyledons flattened, flexible and convolute (versus cotyledons separate, strongly anisocotylar, those of conspicuously different shape and size, the larger one massive, compact and adapted for storage and the distinctive smaller one sometimes even absent; Franceschini & Tressens, 2004; Cornejo & Iltis, 2008c).

#### KEY TO THE SPECIES

- 1a. Flower buds just before anthesis 8–10 mm diam., petals 9–12 mm, stamens 40–63; fruits at maturity white-porcelain, fruit wall 4–8 mm thick, leaf blade margins frequently undulate; southern Mexico to northern Colombia and Venezuela ..... *Neocapparis pachaca*  
 1b. Flower buds just before anthesis 6–7 mm diam., petals (7–9)–(10), stamens ca. 30–38; fruits at maturity yellow, fruit wall 2–4 mm thick; leaf blade margins smooth; coastal Ecuador and Peru ..... *Neocapparis quina*

#### 1. *Neocapparis pachaca* (Kunth) Cornejo, *comb. nov.* Fig. 1A–B.

Basionym: *Capparis pachaca* Kunth, Nov. Gen. et Sp. Pl. 5: 93. 1821. TYPE: VENEZUELA. Sucre: «*Crescit in sylvis prope Cumaná. Floret Septembri.*» A. von Humboldt & A. Bonpland 357 (Lectotype: P, designated in Cornejo and Iltis, 2008a).

Homotypic synonyms: *Capparidastrum pachaca* (Kunth) Hutch., Gen. Fl. Pl. 2: 310. 1967.

*Capparidastrum pachaca* subsp. *oxysepalum* (Wright ex Radlk.) H. H. Iltis, Harvard Pap. Bot. 13(2):235. 2008, *syn. nov.*

*Capparis pachaca* subsp. *oxysepala* (Wright ex Radlk.) H. H. Iltis, S. W. Naturalist 10(1): 61. 1965.

Heterotypic synonyms: *Capparis oxysepala* Wright ex Radlk., in Sitzb. Math. Phys. Acad. Wiss. München 14: 172. 1884. TYPE: NICARAGUA. Omotepec [Omotepe?], 1853–1856, C. H. Wright 2 (Lectotype; M [two leaves and a fragment of inflorescence, ex GOET] designated in Cornejo and Iltis, 2008a; Isolectotypes: GH, GOET, US).

**Local names:** México: chochcitam, (*Gaumer* 661); colocmax de montaña (*R. Flores* 1); x-chooch kitam (*Ucan* 805); Honduras: palo de rosa (*Holst* 1711); Nicaragua: lima de monte (*Iltis* 30934, 30937, 30938); lima del monte (*Laguna* 214); limoncillo (A. *Danin* 77-22-1); naranjilla (*Grijalva* et al. 2150); naranjillo (*Aranda* 124); Colombia: cotorrito (*Elias* 808); calabacito de monte, calabacito de montaña (*Paul*), calabacillo, totumito (*Dugand* 130); Venezuela: ajicito (*Fernández* 267), bachaco (*Agostini* 533), chirica (*Ruíz & Rohón* 3740), mamón chuco (*Nucette* 109), pachaco (*Guzmán & Cumaná* 22), tocorito (*Aristeguieta & Zabala* 7021), zorrocloco (*Vivas* 62).

**Distribution:** dry forests, southern Mexico (Oaxaca, Guerrero) to coastal northern Colombia and Venezuela.

**Additional specimens examined:** MEXICO. Guerrero: Mun. Zihuatango, Isla Ixtapa, 22 Mar 1976 (fl), *M. Pérez s.n.* (MEXU, photocopy WIS). From San Marcos to Copala, 200–500 feet, 8 Feb 1895 (fl), *E. W. Nelson* 2288 (NY, US, fragm. WIS). 9 km SE San Luis–San Pedro, 2 km S to Los Tarros, selva baja espinosa, 2 Feb 1980 (y fl), *B. Leuenberger & C. Schiers* 2724 (B). Guerrero to Pinotepa Nacional 8.5 mi, E of Acapulco, 10 Feb 1971 (fl), *Freeland & Spetzman*

208 (MEXU). Guerrero, Atoyac–Cacalutla 18 Nov 1965 (st), *L. Vela* 1501 (MEXU). **Oaxaca:** Tehuantepec, San Geronimo, local names: “Biahni,” “Zapote prieto,” *E. Seler* 1884 (B, CAL, GH, US, photo WIS); grazed areas 3 km W of Ixtepec, ca 50 m or less, 9 Jul 1959 (fr), *R. M. King* 1479 (TEX, US, photo & fragm. WIS). Plains N of Tehuantepec, 20 Dec 1944 (fl), *J. Alexander* 104 (MEXU, MICH, NY). Ruta 190, Tehuantepec a Juchitán de Zaragoza, ca 12 km al NE de Tehuantepec, selva baja caducifolia, “flor perfumada,” 9 Dec 1980 (fl), *D. H. Lorence & R. Cedillo* 3026 (WIS). 12 km NE of the city of Tehuantepec, along the Panamerican highway (routes 185 & 190), elevation less than 50 m, vegetation mainly of thorny leguminous shrubs and cacti, 7 Jul 1958 (fr), *R. M. King* 388 (ENCB, MICH, TEX, US, WIS). 4 km al E de Tehuantepec, km 802, 20 m, 1964 (fr), *E. Hernández* G114 (CHAPA, WIS). Flat grazed areas 4–5 km E of Juchitán, along Panamerican highway (routes 185 & 190), 50 m, 12 Jul 1959 (fr), *R. M. King* 1603 (TEX, US, fragm. WIS). Flat grazed areas 16 km N, NE of Tehuantepec along Panamerican highway (routes 185 & 190), 50 m, 7 Jul 1959 (fr), *R. M. King* 1386 (MICH, NY, TEX, US, fragm. WIS). **Campeche:** Alrededores de la Zona Arqueológica de Edzna, a 20 km al S del km 44 de la carretera Campeche–Hopelchén, veg. acahual de selva mediana, 4 Aug 1984 (fr), *E. Cabrera & H. de Cabrera* 7126 (F, MEXU, TEX, photocopy WIS). 19 km al S de Cayal, km 44 de la carretera 180, cerca de la Zona Arqueológica de Edzna, veg. acahual de selva mediana, 21 May 1985 (fr), *E. Cabrera, H. de Cabrera, O. Canul* 8511 (MEXU, MO, TEX, photocopy WIS). **Yucatán:** Progreso, local name: “colocmax de montaña,” 1932 (fl, y fr), *R. Flores* 1 (F, photocopy WIS); 11 km al N, Sierra Papacal, 894830 W 211015 N, 22 Abr 1993 (st), *M. Mendez, P. Simá & R. Durán* 832 (MEXU, photocopy WIS). Port Silam, Izimal, local name: “chochcitam,” (fl), *G. F. Gaumer* 661 (BM, C, CM, F, GH, MO, US). Between Uitzina and Catmis, 4 Apr 1985 (fl), *D. A. White* 390 (WIS). Mun. Río Lagartos, km 5 y 6 del cruceo rumbo a San Felipe, selva baja caducifolia, suelo moreno lujoso, local name: “x-chooch kitam,” uses: medicinal y melifera, ca 0 m, 1 Apr 1981 (fl), *E. Ucan* 805 (WIS). 4–6 km al O de Las Coloradas, sobre camino al cruceo San Felipe–Río Lagartos, 22 Mar 1988 (fl), *E. Cabrera & H. de Cabrera* 15740 (MEXU, photocopy WIS). San Felipe, 1 km NO del rancho “Xpanha-toro,”

Reserva Ecológica de Dzilam, 10 Abr 1991 (fl), *J. Tun* 563 (MEXU, photocopy WIS). 6 km S de Telchak Puerto, sobre el camino a Telchak Puerto y Motul, 24 Jul 1986 (fr), *E. Cabrera & H. de Cabrera* 11685 (MEXU, photocopy WIS). Between Uitzina and Catmis, 4 Apr 1985 (fl), *D. White* 390 (WIS). HONDURAS. **Comayagua:** Ajuterique, matorral seco, 600 m, 14 Apr 1984 (fl, fr), *B. Holst* 1711 (MO, photo WIS), 1714 (MO, photo WIS). NICARAGUA. **Carazo:** Banco N del Río Escalante, 6 km corriente arriba de la desembocadura, 24 Aug 1977 (fl), *D. Neill* 2433 (MO). Sobre la quebrada de la finca Las Nilas, ca 6 km NW de la desembocadura de Río Escalante, bosque de galería, 86°11'W, 11°38'N, 100 m, local name: "naranjilla," 11 Jan 1983 (fl), *A. Grijalva, N. Lopez & R. Gilder* 2150 (WIS). Municipio Diriamba, "San Antonio," 6 km al S de La Trinidad, 86°19'W, 11°41'N, ca 50 m, 5 Jun 1984 (fr), *P. Moreno* 24205 (WIS). Río Grande, Casares, 86°20'W, 11°38'N, 20 m, 30 May 1983 (fr), *P. Moreno* 21390 (WIS). 3 km al S de Río Grande, 86°14'–15'W, 11°43'–44'N, 130–150 m, Jan 1984 (y fl), *M. Araquistain* 3773 (WIS). La Palma, Chacocente, local name: "naranjillo," 12 Dec 1984 (fl), *A. Aranda* 124 (MO, WIS). Refugio de vida Silvestre Chococente, bosque seco tropical, 86°07'–12'W, 11°30'–35'N, 20–80 m, local name: "naranjillo," 14 Apr 1984 (fr), *J. Sandino* 4967 (WIS). Área de la Estación Biológica de Chacocentro, en el límite departamental de Carazo-Rivas, bosque seco tropical, 1–100 m, 22–23 Jun 1984 (fr), *D. Soza, A. Grijalva & M. Aranda* 96 (WIS); ibidem, común, 4 Feb 1984 (fl), *A. Grijalva & N. Almanza* 3548 (WIS). **Rivas:** Bosque de Chococente junto al Río Escalante, 86°10'–12'W, 11°31'–32'N, ca 10–30 m, 15 Feb 1984 (fl), *M. Araquistain* 3796B (WIS). Puente de Ochamogo, km 80 carretera Sur, sobre el camino a San Rafael, 85°57'W, 11°39'N, ca 50 m, 25 Jan 1984 (fl), *P. Moreno & W.D. Stevens* 22870 (WIS). **Chontales:** 4 km al NW de Santo Domingo, bosque tropical húmedo, suelos arcillosos, 85°06'W, 12°17'N, 390–400 m, 5 Apr 1984 (fr), *D. Soza & A. Grijalva* 22 (WIS). **Matagalpa:** Puertas viejas, 86°03'W, 12°36'N, bosque seco tropical, 8 Jul 1982 (fr), *M. Araquistain* 2959 (MO); ibidem, ca 500–600 m, 8 Feb 1983 (fr), *M. Araquistain* 3447 (MO, photocopy & fragm. WIS); camino a San José de los Remates, 86°01'W, 12°35'N, ca 430–470, 10 May 1982 (fr), *P. Moreno* 16248 (WIS). La Mojada, 10 km SO de Esquipulas, 85°51'W, 12°37'N, ca 400 m, 24 Jan 1985 (y fl), *P. Moreno* 25350 (MO). Sébaco valley, 2.5 km W of Sébaco slightly alkaline soil, local name: "limoncillo," 7 Sep 1977 (fl), *A. Danin* 77-22-1 (MO, photocopy WIS). SW slopes of Cerro El Pilón and adjacent Laguna Tecomapa, 86°02'W, 12°37'N, ca 420–540 m, roadside, low thorn scrub and pastures on rocky slopes and dry lakebed with heavy black soil and water just below surface, 20 Jul 1978 (fr), *W. D. Stevens* 9461 (WIS). Km 77 carretera Norte, between Laguna Tecomapa and las Calabazas, ca. 86°04'W, 12°38'N, ca. 400 m, 13 Jul 1983 (fr), *W. D. Stevens* 22239 (WIS). La Aurora, Río Viejo, 15 May 1984 (fr), *M. Castro* 131 (WIS). Dario, Las Joyas, en la quebrada a 7 km de la carretera Panamericana, sobre el camino a Terrabona, 86°01'W, 12°45'N, 480–500 m, 18 Jun 1981 (fr), *P. Moreno* 9283

(MO, photocopy and fragm. WIS). km 71 entrada a Esquipulas, tierra blanca, pedregoso con grandes pendientes, sonsocuitoso, local name: "lima del monte," 8 Feb 1983 (fr), *A. Laguna* 214 (MO, photocopy WIS). **Boaco:** Hacienda San Antonio, carretera a Boquito, 85°44'W, 12°26'N, ca 200 m, 17 Jan 1984 (y fr), *P. Moreno & W. Robleto* 22812 (WIS). San Antonio, 2 km al SE de Boquito, 85°44'W, 12°26'N, ca 200 m, 19 Jun 1982 (fr), *P. Moreno* 16589 (WIS); u km al S de Boquito, 85°44'W, 12°26'N, ca 200 m, 21 Oct 1982 (y fl), *P. Moreno* 18014 (WIS). Flat valley bottoms of Río Boaco, 4 km NW of junction (emplame) of Boaco (hwy # 9) and Juigalpa (hwy # 7) hwy, ca 66 km NE of Managua (ca 9 km SW of Boaco), 85°43'W, 12°26'N, 260 m, local name: "lima de monte," 21 Dec 1991 (fr), *H. H. Iltis, M. Castillo & C. Medina* 30937, 30938 (WIS); 2 km NW of junction (emplame) of Boaco (hwy # 9) and Juigalpa (hwy # 7) hwy, ca 60 km NE of Managua (ca 15 km SW of Boaco), 85°46'W, 12°25'N, 180 m, 21 Dec 1991 (y fl, fr), *H. H. Iltis, M. Castillo & C. Medina* 30933 (WIS 2 sheets); ca 64 km NE of Managua (ca 11 km SW of Boaco), 85°43'W, 12°25'30"N, 200 m, 21 Dec 1991 (fr), *H. H. Iltis, M. Castillo & C. Medina* 30934 (WIS 5 sheets); ca 65 km NE of Managua (9–10 km SW of Boaco), 85°43'30"W, 12°26'30"N, 240 m, 21 Dec 1991 (y fl, fr), *H. H. Iltis, M. Castillo & C. Medina* 30935 (WIS 3 sheets). Camino Boaco-Camoapa, ca 10 km SW de Camoapa, region arida, pedregosa, en potreros bien degradados, 85°35'W, 12°20'N, 350 m, 8 Feb 1983 (fr), *A. Grijalva & W. Robleto* 2302 (WIS). 1.6 km N of Tecolostote, 85°39'W, 12°15'N, ca 110 m, 4 Feb 1984 (fl, fr), *W. D. Stevens* 22850 (MO, WIS). La Concha, between Las Banderas and Teustepe, grazed thorn forest, ca 85°53'W, 12°22'N, ca 120 m, 4 Feb 1984 (fl), *D. W. Stevens* 22847 (WIS). **Managua:** Along road from hwy 1 (N of San Jacinto entrance) to San Francisco del Carnicero, ca 4.8 km W of hwy 1, less than 100 m, low thorny forest and black soil, *W. D. Stevens, P. Moreno & M. Araquistain* 17120 (WIS). Plains NE of lago de Managua, on road towards San Francisco del Carnicero, 60 m, 3 Mar 1982 (fl), *C. Hughes & B. Styles* 67 (OXF). Camino a San Francisco, 2 km de la carretera Panamericana Norte, 86°04'W, 12°22'N, ca 50–60 m, 28 May 1981 (fr), *P. Moreno & J. Henrich* 8768 (WIS). A 3 km de la carretera Managua-Sebaco, camino a San Francisco Libre, ca 100–120 m, 26 Jan 1981 (y fl), *J. Sandino* 369 (WIS). Camino a San Francisco Libre, a 1 km de la carretera Managua-Sébaco, 90–100 m, 28 May 1981 (fr), *J. Sandino* 648 (WIS). Los Brasiles, 10 km SO de Las Banderas, 85°05'30"W, 12°15'30"N, 80–100 m, 24 Feb 1979 (fr), *A. Grijalva & M. Araquistain* 124 (WIS). **Granada:** Isla Zapatera, falda NW de cerro El Llano, 85°50'W, 11°45'N, 250 m, 21 Jan 1982 (fl), *J. Sandino* 1982 (WIS). Inter Granada et Nicaragua (Managua?), Feb 1848 (fl), *Oersted* 3166 (C, US, fragm. WIS). COSTA RICA. **Guanacaste:** Santa Rosa National Park, dry hills beyond Manilkara forest, 85°40'W, 10°48'N, 0–50 m, 12 Feb 1978 (fl), *R. Liesner* 5275 (MO, WIS); dry river between Manilkara forest and fork in road to Naranjo Beach, Río Poza Salada, 85°39'W, 10°48'N, 5–20 m, 27 Jan 1978 (y fl), *R. Liesner* 4588 (MO, PMA, WIS); W of Panamerican hwy

1, ca 37 km N of Liberia, ca 2 km inland from Playa Naranjo, in dry deciduous forest, 23 Feb 1973 (fl), *L. Loveless* 1977 (DUKE, photocopy & fragm. WIS); canton de Liberia, P. N. Santa Rosa, de Bahía Salinas a Santa Cecilia, Santa Rosa, sendero a Carbonal, 85°37'02"W, 10°51'09"N, 200–250 m, 10 May 1994 (fr), *R. Espinoza* 1108 (K, WIS); camino a Playa Naranjo, bosque siempre verde, 21 Feb 1986 (fr), *N. Zamora*, *L. Poveda*, *Q. Jimenez* & *K. Eymert* 1190 (CAS, MO, photocopy WIS); 8 m, 28 Sep 1972 (st), *L. Poveda* 315 (F, photocopy WIS). PANAMA. **Darién:** Near Refugio, 15–21 miles N of Santa Fé, ca 30 m, 16 Feb 1967 (fl), *J. A. Duke* 10273 (DAV, MO, OU, photo WIS). COLOMBIA. **Atlántico:** Barranquilla and vicinity, Mar 1934 (fl, fr), *B. Elias* 1199 (F, MA 2 sheets, P, US, photocopy WIS); ibidem, *B. Elias* 445 (F, GH, K, NY, US); “cotorrito,” 9 Jan 1930 (fl), *Elias* 808 (US); “calabacito de monte,” “calabacito de montaña,” 1925, *B. Paul* 41 (US). Near Barranquilla, local name: “calabacillo, totumito,” 12 Oct 1932 (fr), *A. Dugand* 130 (COL, F, MADw, US, photocopy WIS). Ponedera-Giraldá-Suán district, *A. Dugand* 482 (F, MADw, photocopy WIS). In forest near Juan Mina, 60 m, local name: “calabacillo,” Feb 1936 (fl), *A. Dugand* 932 (F, MADw, photocopy WIS). On road from Barranquilla to Galapa, 150' above sea level, Abril 1932 (fl), *A. Dugand* 9 (F, MADw, photocopy WIS). Entre Galapa y Juan Mina, muy comun, 30–50 m, 19 Apr 1937 (fl), local names: “totumito,” “calabacito de monte,” *A. Dugand* 130-B (US, photocopy WIS); ibidem, 8 May 1938 (y fr), *A. Dugand* 1185, 1186 (US). Puerto Colombia, less than 200 m, 7 Jan 1948 (fl), *F. Barkley* & *G. Gutiérrez* 1843 (BM, F), 1849 (F); ibidem, Jan 1932 (fl), *Elias* 935 (US); same date (fl), *B. Paul* 935 (F); muy comun en los alrededores, (fl), local name: “cotorrito,” *Elias* 1056 (US). Puerto Colombia, Miramar, en fruticetum costanero árido, 0–25 m, 19 Dec 1945 (fl), *A. Dugand* 4016 (COL, US). Entre Puerto Colombia y Salgar, fruticetum árido litoral y playas arenosas, local name: “calabacito,” 23 Jul 1943 (fl), *A. Dugand* & *Jaramillo* 3236 (COL, US). Piojó, Los Mameyales, 350–400 m, en bosques sombreados, “flores rosadas,” 11 Jan 1980 (fl), *A. Dugand* & *H. Garcia-Barriga* 2412 (COL, US). **La Guajira:** Serranía de la Macuira, Nazareth, cerro Itojoro, bosque muy seco, suelo pedregoso fuertemente inclinado, 250–432 m, 15 Jul 197? (fr), *H. Bernal* & *A. Sudgen* 8 (COL, PMA, photocopy WIS); ibidem, 400 feet, *C. Saravia* & *M. de Saravia* 3653 (NY, US). Mun. Riohacha, vía Riohacha-Manaure-Uribia, 72°25'W, 11°36'N, 0–500 m, 14–20 Feb 1989 (fl), *L. Atehortúa* & *Grupo Fitogeografía* 31 (HUA, MO, WIS). 5–8 km E of Riohacha, ca 20 m, 28 Nov 1959 (y fr), *Cuatrecasas* & *Castañeda* 25461 (US). Mun. Barrancas, corregimiento Manantial, carretera Manantial-Roche, Arroyo Aguas-Blancas, 72°41'W, 11°02'N, 120 m, 1 May 1988 (fr), *F. J. Roldán*, *L. García* & *G. Sylva* 963, 976 (HUA, MO, photocopy WIS). Entre Uribia y Maicao, local name: “toco,” 15 Jul 1956 (fr), *M. del Llano* 1 (US). Entre Uribia, Maicao y cerro de La Teta, 26–28 Feb 1962 (fl), *C. Saravia* & *Johnson* 87 (US). 9 km de Uribia rumbo a Maicao, suelos inundables, 29 Mr 1962 (y fr), *C. Saravia* & *D. Johnson* 302 (US). Forest near Carraipía, local name:

“colocolo,” Nov 1916 (st), *M. T. Dawe* 584, 589 (K, US); ibidem, *Elias* 445 (K). **Magdalena:** Santa Marta, Mar 1842 (fl), *N. Funck* 540 (BM, G, K, LE, photocopy WIS); ibidem, near sea level, Sept 1898–1901 (fl), *H. H. Smith* 449 (BM, BR, CM, GH, K, MICH, MO, NY, UC, US, VT, WIS); 2000 ft, Jan 1898–1901 (fl), *H. H. Smith* 902 (BM, CM, COL, GH, K, MICH, NY, P, US, VT, photocopy WIS); *Goudot* 2 (K). N slope of Sierra Nevada de Sta. Marta, Jul 1932 (fr), *W. Seifriz* 610 (US). Near Fonseca, 175 m, 13 Feb 1944 (fl), *O. Haught* 3995 (F, INA, NY, US, fragm. WIS); ibidem, 130 m, 1 Oct 1944 (fl), *O. Haught* 4383 (U, US). Cerrejón, ca 200 m, 2 Aug 1949 (fl, fr), *O. Haught* 6567 (US, fragm. WIS). Mamatoco, 29 Abr 1944 (fl, fr), *R. Romero-Castañeda* 105 (MADw, MO, photocopy WIS). Mun. Santa Marta, Parque Nacional Natural Tayrona, Ensenada de Neguanje, 21 Sep 1976 (y fr), *G. Lozano* & *Schmetter* 2921-A (NY). Valle de Rio Cesare, al O de Los Venados, ca 60 m, 11–13 Feb 1961 (fl), *A. Dugand* 5576 (US). **Norte de Santander:** Vertiente oriental, entre el Rio Zulia y Cucuta, ca 450 m, 24 Jul 1940 (y fr), *Cuatrecasas* & *H. Garcia-Barriga* 10163 (US). **Bolívar:** Volcán de Lodo, Santa Catalina-Galerazamba road, N tip of Bolivar, dry scrubby forest, 75°15'W, 10°45'N, near sea level, 30 Jun 1984 (fl, fr), *A. Gentry* & *H. Cuadros* 47394 (MO, WIS). Mun. San Martin de Loba, alrededores de Pueblo Nuevo, al borde de la cienaga del Totumo, 75°15.8'W, 10°17.5'N, local name: “naranjito,” 17 Feb 1989 (fl), *O. Marulanda* 839 (HUA, MO, WIS); entre Hacienda Las Marias y La Cienaga del Totumo, 75°15.8'W, 10°17.5'N, 17 Feb 1989 (fr), *O. Marulanda* 820 (HUA, MO, photocopy WIS). Mun. Carmen de Bolívar, vía Carmen-Zambrano, 31 Jan 1987 (fl), *H. Cuadros* 3219 (MO, photocopy WIS). Mun. Cartagena, corregimiento Punta Canoa, Loma Mogollon, 3 Feb 1987 (y fl), *H. Cuadros* 3251 (WIS). **Antioquia:** Municipio de Arboletes, vereda La Toyosa, 100 m, 30 Mar 1983 (y fr), *R. Bernal* & *G. Galeano* 519 (NY 2 sheets, photocopy WIS). VENEZUELA. **Zulia:** Dtto. Urdaneta, carretera entre km 20 de la carretera Perijá y el Autódromo-La Cañada, unos 15–20 km al S del km 20 de la carretera a Perijá, en zona de bosque seco-muy seco, 10 Mar 1978 (fl), *G. Bunting* 6227 (WIS). Vicinity of Perijá, *Tejera* 93, 108, 262, 266 (US). Dtto. Maracaibo, carretera Perijá, entre Maracaibo y La Villa del Rosario, en km 27 de la vía, 5 Mar 1978 (fl, fr), *L. Aristeguieta* & *A. Ferrer* 12544 (NY, WIS). Dtto. Miranda, via Palmarito-Cataneja, por la tubería que conduce hasta el km 42, local name: “mamón chuco,” 9 Nov 1982 (fr), *E. Nucette* 109 (NY, photocopy WIS). Carretera Maracaibo-Altagracia, en el km 4 al N del desvío de la carretera Maracaibo-Coro, en bosque seco al O de la carretera, 8 Sep 1977 (fl), *G. Bunting* 5393 (WIS). Cerca de San Francisco, local name: “mamón de venado,” 20 Jun 1968 (y fr), *R. Smith* 3874 (VEN). Dtto. Bolívar, carretera Lara-Zulia, a unos 8 km del puente sobre el lago, 19 Apr 1977 (fr), *L. Aristeguieta*, *G. Bunting* & *L. Chacón* 12339 (WIS). Carretera Maracaibo-Cabimas, entre la carretera Lara-Zulia y Cabimas, en la reserva al lado del río Mene, en bosque deciduo, 22 Mar 1979 (fr), *G. Bunting* & *A. Alfonzo* 7119 (WIS). Carretera Maracaibo-Altagracia, en km 4 al noroeste del desvío de la carretera Maracaibo-Coro, en



bosque seco, 7 Feb 1978 (fl), *G. Bunting* 6185 (WIS). Tia Juana, selva tropofita, 4 Jan 1954 (fl), *E. Little* 16127 (MER, VEN, photocopy WIS). Alrededores de Mene Grande, 1939 (fr), *Woolger* 39 (VEN, photocopy WIS). **Falcón:** Between La Vela and Cumarebo, 4 Abr 1917 (fl), *H. M. Curran & M. Haman* 486 (GH, NY, US, fragm. WIS). Mene de Mauroa, 13 May 1972 (fr), local name: "mamón de chuco," *B. Trujillo* 11083 (MY, photocopy WIS). Tigre sentado, 4 km W de Agua Clara, 21 Oct 1961 (fr), *T. Lasser* 4379 (VEN, photocopy WIS). Between Paso de Piedra and El Caballo, 69°16'–17°W, 11°04'N, 80 m, 13 Feb 1977 (st), *J. Steyermark & A. González* 113796 (WIS). Dtto. Buchivacoa, carretera Dabajuro-La Danta, 2 km después del Fundo Agropecuario La Rosita, 160 m, 22 Dec 1981 (fl), *T. Ruiz & F. Rohón* 3651 (MY, NY, WIS). Tiguaje, area culturizada, 100 m, 29 Sep 1977 (fl), *T. Ruiz & Equipo de Ecología*, 2056 (WIS). Dtto. Colina, carretera Guaibacoa Semeruco-Dos Bocas, ca 6 km de Guaibacoa, suelo arcilloso rojizo, 200 m, local name: "chirica," 19 Jun 1982 (fr), *T. Ruiz & F. Rohón* 3740 (MY, NY, photocopy WIS). Along old highway from La Vela de Coro to the dam ("presa") Hueque de Río Sicoa near Macoruca, ca 10 km SE of Guabaicoa at base of south-facing slope of NE end of Sierra de San Luis, ca 24 km ESE de Coro, ca 69°28'W, 11°27'N, ca 350 m, 7 Jan 1991 (st), *H. H. Iltis, T. Ruiz & C. Benítez* 30522 (WIS); ibidem, *H. H. Iltis, T. Ruiz & C. Benítez* 30523 (WIS). Cerro Puerto Escondido, cerros escarpados con algunos afloramientos rocosos, 200 m, 14 Apr 1977 (y fr), *T. Ruiz & equipo de Ecología* 1334 (MY, WIS). Dtto. Zamora, in front of a house in main highway (# 3), halfway between Valencia and Coro at Marsillal de la Costa, dry semi-evergreen to deciduous woodlands in region rich in *Capparaceae* associates, 68°50'W, 11°12'N, 180 m, *H. H. Iltis, T. Ruiz & C. Benítez* 30510 (WIS 2 sheets). Marcillal de la Costa, cerca de Mirimire, 27 Jun 1967 (fr), *B. Trujillo* 8462 (MY 2 sheets, photocopy WIS). **Anzoátegui:** Km 227 on Caracas-Barcelona highway, 16 km E of Boca de Uchire, *A. Gentry & P. Berry* 14797? (MO, photocopy WIS), ca 5 km SE de Anaco, 64°26'W, 9°27'N, 3 Mar 1979 (fl), *G. Agostini* 2655 (MO, NY, photocopy WIS). Alrededores de Píritu, zona de vegetación seca, "frutos comidos por los acures," local name: "bachaco," 18 Aug 1965 (fl), *G. Agostini* 533 (NY, photocopy WIS). Alrededores de Puerto Píritu, local name: "bachaco," 21 Aug 1965 (fl), *G. Agostini* 552 (NY, photocopy WIS). Bosque tropofito de Santa Cruz, ca 13 km al O de Clarines, 120 m, 12 Dec 1960 (st), *L. Ruiz* 329 (MER, photocopy WIS). Alrededores de Barcelona, local name: "tocorito," 28 Mar 1969 (fl), *L. Aristeguieta & H. Zabala* 7021 (NY, VEN, WIS). Cantaura, 19 Apr 1950 (fl, fr), *F. D. Smith* 139 (US). Isla Cachicamo, al N de Pertigalete, 64°33'W, 10°18'N, 0–3 m, 1 Sep 1973 (st), *J. Steyermark & B. Manara* 107888 (WIS). **Lara:** San Francisco, Carora basin, 19 Sep 1969 (fr), *R. Smith* V5705 (WIS). Carretera Carora-Maracaibo, ca 7 km desde Carora, 23 Jun 1995 (fl, y fr), *T. Ruiz & R. Villafañe* 4728 (MY). 10 km antes de Copeyal, vía a Santa Inés, 30 Mar 1980 (fl), *N. Ramírez* 307 (MO 2 sheets, NY, photocopy WIS). La Quebrada Las Raíces, La Guadalupe, zona xerófila, local name:

"zorrocloco," 12 Sep 1954 (fl), *J. Vivas* 62 (VEN, photocopy WIS). Bobare, 20 Mar 1969 (fl), *R. Smith* V5293 (VEN). **Sucre:** Cumaná, Jun 1842 (fl), *Funck* 17 (G, P, photocopy WIS); calle San Bruno, crece en suelos secos, arenosos, arcillosos, local name: "pachaco," 12 Dec 1977 (fr), *M. Guzmán & L. Cumaná* 22 (WIS); detrás del Hotel Los Bordones, 25 Jan 1978 (fl), *M. Guzmán & L. Cumaná* 60 (WIS). Base of rocky chaparral bordering salt flats at Bordones, SW of Cumana, 10–15 m, 23 May 1945 (fr), *J. Steyermark* 62918 (F, MO, VEN, photocopy WIS). Isla de Arapo (del Este), "Arepito," N of Arapito, NW of Playa Colorado, 64°28'W, 10°16'N, 0–20 m, 1 Sep 1973 (st), *J. Steyermark & B. Manara* 107897 (VEN, WIS). Península de Araya, 4 km E and W of Caimancito, 5 to 14 km W of start of new road, 63°54'W, 10°38'N, 0–50 m, 19 May 1981 (fl, fr), *R. Liesner & A. González* 12107 (WIS). Vicinity of El Tacal, ca 6–8 km SW of Cumana on old highway to Santa Fe in bottom of valley behind coastal hills and ca 2 km from the Atlantic Ocean, 64°13'W, 10°25'N, ca 50–75 m, 12 Jan 1991 (st), *H. H. Iltis, L. Cumaná, R. Delgado, C. Benítez & T. Ruiz* 30555 (WIS). Isla Margarita, 0–850 m, local name: "pachaco," Aug 1955 (fl), *Bernardi* 2463 (MER, NY 2 sheets, photocopy WIS); Valle, *Johnston* 9 (GH). **Guárico:** Dtto. Rivas, Río Tamanaco (puente), local name: "pachaco," 19 Mar 1978 (y fr), *G. Correa* 16 (F, photocopy WIS). **Miranda:** 7 km E of Cúpira, new road 1 km S of main road, starting at Río Chupaquire S of El Guacuco, 65°38'W, 10°09'N, 0–150m, 16 May 1981 (y fr), *R. Liesner & A. González* 11904 (WIS). **Táchira:** thickets and scrubby xerophytic vegetation, between Tienditas and Ureña, near Venezuelan-Colombian border, 72°26'30"W, 7°54'N, 330 m, 13 Nov 1979 (y fl, fr), *J. Steyermark, R. Liesner & A. González* 120214 (WIS). Dependencia Federal: Isla de los Testigos, Isla Testigo Grande, local names: "ajicito," "pachaco," 26 Dec 1982 (y fr), *Fernández* 267 (CAR, PORT); ibidem, 28 Dec 1982 (fl), *Flores* 284 (PORT); 5 Jan 1984 (fl), *Fernández* 645 (PORT).

## 2. *Neocapparis quina* (J. F. Macbr.) Cornejo, *comb. nov.*, Fig. 1C–D.

Basionym: *Capparis quina* J. F. Macbr., *Candollea* 5: 357. 1934. *Capparidastrium quina* (J. F. Macbr.) Cornejo & H. H. Iltis, *Harvard Pap. Bot.* 13(2):235. TYPE: PERU. Dept. San Martín, Río Mayo, Tarapotó, 360–900 m, 14 December 1929 (fr), *Williams* 6282 (Holotype: F [photo negative 51624 at WIS]; Isotype: US).

**Local names:** Ecuador: jagua (*Valverde* 406), mango de caballo (*Bonifaz & Cornejo* 2756), naranjillo (*Bonifaz* 1058), pomarosa (*Cerón et al.* 13924, 13941). Perú: chuchuhuasi (*Ríos* 5), pirocaspi (*Zegarra* 12), quina-quina (fide Macbride, op. cit.), quirio-quirio (*Albán* 2411).

**Distribution:** dry forests of Western Ecuador and Peru.

**Additional specimens examined:** ECUADOR. **Manabí:** Río Chico, bosque muy seco Tropical, 80°49'W, 1°36'S, 80 m, 10 Nov 1990 (fl), *C. Bonifaz & X. Cornejo* 4069 (GUAY, WIS). Machalilla National Park, road from San Vicente to Guale, 80°45'W, 1°40'S, 60 m, 18 Jan 1991



(fl), A. Gentry & C. Josse 72375 (F, MO, QCNE, WIS); sector Guala-Llorona, 80°44.49'W, 1°40.07'S, 70–200 m, 3 Jun 2010 (fr), C. Cerón *et al.* 67952 (QAP); sector Los Piqueros, 80°50'W, 1°34'S, 200 m, 5 Sep 1991 (fr), C. Josse 618 (QCA, WIS), 619 (QCA); Punta Los Piqueros, 80°35'W, 1°31'S, 30 m, 12 Dec 1992 (fl), Hernández *et al.* 272 (QCA [2], QCNE); sendero desde la parte alta de Los Piqueros hasta Punta Piqueros, c. 25 m, 31 Jul 1992 (fl), Gavilánez *et al.* 979 (QCA [2], QCNE); Agua Blanca hasta cerro San Francisco por estero San Francisco, 80°44'W, 1°33'S, 150 m, 10 Sep 1991 (fr), Josse 660 (AAU, QCA); Playa Los Frailes, 80°47'W, 1°29'S, 0 m, 1 May 1995 (fr), C. Bonifaz & X. Cornejo 2756 (GB, GUAY, WIS); Sector Playita, 80°49'W, 1°34'S, c. 60 m, 5 Apr 1991 (fr), C. Cerón

*et al.* 13924, 13941 (QAP, QCNE). Vic. Salango, savanna and semideciduous forest close to the beach, 80°51'W, 1°36'S, c. 25 m, 26 Jun 1987 (fl), J. Madsen 63681 (AAU, QCA, QCNE). **Santa Elena:** Guala-La Entrada, 80°45'W, 1°42'S, 120 m, 22 Jun 1985 (fl, fr), C. Bonifaz 1058 (GUAY, WIS). Al sur del pueblo de Carrizal, al pie de la cordillera de Colonche, May 1978 (fl), F. Valverde 406 (SEL). PERU. **San Martín:** Km. 25. Carretera Tarapoto-Juanji, 23 nov 1982 (fl), J. Ríos 5 (MO). San Martín, 345 m, 28 Dec 1974 (fl), H. Zegarra 12 (MO). Huallaga, Ganadero Amazonas, San Rafael, 350 m, 27 Nov 1985 (fr), J. Albán 2411 (F). **Cuzco:** Calca, Dist. Yanatile, camino hacia Lacco Yavero, bosque intervenido, 12°19'S, 72°18'W, 1815 m, 26 Feb 2005 (fr), L. Valenzuela 5271 (CUZ, MO, MOL, USM).

## LITERATURE CITED

- BRICEÑO, M., J. F. CARRIÓN, AND W. CINEA. 2015. Análisis filogenético de *Capparis sensu lato* (Capparaceae) en Costa Rica. Pages 132–137 in M. BLANCO, L. MAJURE, EDS. Organización para Estudios Tropicales Memoria del curso Sistemática de Plantas Tropicales, 30 June–3 August 2015. Costa Rica.
- CARDINAL-McTEAGUE, W. M., K. J. SYSTMA, AND J. C. HALL. 2016. Biogeography and diversification of Brassicales: A 103 million years tale. *Mol. Phylogenet. Evol.* 99: 204–224.
- CORNEJO, X. AND H. H. ILLIS. 2006. New combinations in Capparaceae *sensu stricto* for Flora of Ecuador. *Harvard Pap. Bot.* 11: 17–18.
- AND ———. 2008a. The reinstatement of *Capparidastrium* (Capparaceae). *Harvard Pap. Bot.* 13: 229–236.
- AND ———. 2008b. New combinations in South American Capparaceae. *Harvard Pap. Bot.* 13: 117–120.
- AND ———. 2008c. *Anisocapparis* y *Monilicarpa*: dos nuevos géneros de Capparaceae de América del Sur. *J. Bot. Res. Inst. Texas* 2: 61–74.
- AND ———. 2008d. A revision of *Colicodendron* Mart. (Capparaceae s.s.). *J. Bot. Res. Inst. Texas* 2: 75–93.
- AND ———. 2009a. The reinstatement of *Beautempsia* (Capparaceae) and a key to the genera of Neotropical Capparaceae with variously stellate or peltate indumenta. *J. Bot. Res. Inst. Texas* 3: 683–689.
- AND ———. 2009b. *Hispaniolanthus*: A new genus of Capparaceae endemic to Hispaniola. *Harvard Pap. Bot.* 14: 9–14.
- , ———, AND C. CERÓN. 2014. *Capparidastrium tafallanum* (Capparaceae), a new species from the northwestern Andean slopes of Ecuador. *Harvard Pap. Bot.* 19: 189–191.
- AND ———. 2015. Capparaceae. Pages 242–256 in G. DAVIDSE, M. SOUZA SANCHEZ, S. KNAPP, AND F. CHIANG CABRERA, EDS. *Flora Mesoamericana*, Volumen 2, Universidad Nacional Autónoma de México.
- FRANCESCHINI, M. AND S. TRESSSENS. 2004. Morphology of fruits, seeds and embryos of Argentinian *Capparis* L. (Capparaceae). *Bot. J. Linnean Soc.* 145: 209–218.
- ILLIS, H. H. AND X. CORNEJO. 2007. Studies in the Capparaceae XXX: *Capparicordis*, a new genus from the Neotropics. *Brittonia* 59: 246–254.
- AND ———. 2010. Studies in the Capparaceae XXIX: synopsis of *Quadrella*, a Mesoamerican and West Indies genus. *J. Bot. Res. Inst. Texas* 4: 117–132.
- AND ———. 2011. Two new genera and three new combinations in Neotropical Capparaceae. *Harvard Pap. Bot.* 16: 65–70.

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# DICLIPTERA FRANCODAVILAE (ACANTHACEAE): A NEW SPECIES FROM THE COASTAL DRY FORESTS OF THE PROVINCE OF GUAYAS, ECUADOR

XAVIER CORNEJO,<sup>1,2</sup> DIETER WASSHAUSEN,<sup>3</sup> AND CARMEN BONIFAZ<sup>4</sup>

**Abstract.** *Dicliptera francodavilae* a new species of Acanthaceae from the remnant deciduous coastal dry forests, mainly from the area of Guayaquil, in the province of Guayas, western Ecuador, is here described and illustrated. It is distinguished from the 10 remaining species of the genus in Ecuador by having an inflorescence of terminal, rather loose racemes of umbels, cymule bracteoles narrowly elliptic-oblongate and pilose without and lilac to purple corollas, 15–25 mm long. *Dicliptera francodavilae* is assessed as Vulnerable (VU B1a, b, iii).

**Resumen.** Se describe e ilustra *Dicliptera francodavilae*, una nueva especie de Acanthaceae de los remanentes de los bosques secos deciduos costeros, principalmente del área de Guayaquil, en la provincia del Guayas, en el occidente de Ecuador. Esta nueva especie se distingue de las 10 restantes en este género que se encuentran en Ecuador por poseer una inflorescencia terminal, bracteolas de las cúmulas angostas, elíptico-lanceoladas y externamente pilosas y corolas de color lila hasta púrpura, 15–25 mm long. A *Dicliptera francodavilae* se le asigna el estatus Vulnerable (VU B1a, b, iii).

**Keywords:** Acanthaceae, *Dicliptera francodavilae*, dry forests, Ecuador, endemic, Guayas

During fieldwork for the forthcoming Flora of Guayaquil (Cornejo, en prep.), a persistent herb of *Dicliptera* Juss. (Acanthaceae), was found in few remnants of disturbed coastal dry forest in the city of Guayaquil and surroundings, in western Ecuador. The species was firstly collected in May 1892 by Henrik Franz Alexander Barón von Eggers, while visiting the Puná island, also in the province of Guayas. The Eggers' collection was named by Gustav Lindau as *D. aequitorensis*, a name that has remained unpublished for approximately one hundred years. However, as the epithet "*aequitorensis*" refers to Quito, the Andean city and capital of Ecuador that has nothing in common to the coastal habitat and pattern of distribution of the new species of *Dicliptera*, a different new name is formally proposed here for this interesting novelty.

*Dicliptera francodavilae* Cornejo, Wassh. & Bonifaz, sp. nov. TYPE: ECUADOR. Guayas: Área Nacional de Recreación Parque Samanes, Rocódromo, disturbed deciduous dry forest, 2°06'S, 79°54'W, 10 m, 28 August 2016 (fl), X. Cornejo, M. Gallardo & V. I. Cornejo 8838 (Holotype: GUAY; Isotypes: MO, NY, US). Fig. 1.

*Species nova affinis Dicliptera unguiculata* Nees in Benth. bracteis major cymarum anguste ellipticis ad ellipticis-oblongatis, 2–2.5 mm latis minute apiculatus, dense pilosis, apice spina parva terminatus; inflorescentiis terminalis laxis racemus umbellus ad 12 cm longis; corolla 15–25 mm longis, extra pilosis, lilacinus ad purpureus distinguuita.

*Herb* to 1 m tall, mostly deciduous to semideciduous; main stem erect to decumbent, hexagonal, abundantly pilose, glabrescent at base. *Leaves* decussate; blades thin-foliateous to membranous, shortly lanceolate to ovate or

ovate-elliptic, 2.5–7 × 1–3.5 cm, widely cuneate to obtuse at base, acuminate to sharply-acuminate at apex, the blade pilose and with midvein and secondary ones prominent on both sides, the margins ciliate; main lateral veins 3 to 5 on each side, the tertiaries reticulate; petioles 1–20 × 0.4–1 mm, pilose. *Inflorescences* terminal, a raceme of umbels to digitate, to 12 cm long, and axillary umbels on short peduncles turning to digitate. Outer pair of bracts, narrowly-elliptic to elliptic-oblongate, 7–12 × 2–2.5 mm, sessile at base, rostrate at apex, green, densely pilose. *Calyx* ca. 3.5 mm long, whitish, sepals 5, the lobes narrowly-lanceolate, mostly free, fused at base. *Corolla* bilabiate, 15–25 mm long, lilac to purple, pilose without, the tube 6–10 mm, the lower lip with a white spot at lower half, inconspicuously 3-lobed at apex, the lobes ca. 0.3 mm long (fresh), the upper lip obtuse, entire. *Ovary* conical, ca. 1 mm (fresh), glabrous. *Stamens* 2, the filaments more or less equal to corolla, adnate in throat at base of upper lip, lilac to purple, loosely pilose, anther thecae 2, unequally inserted, white. *Capsule* ca. 5 × 2 mm, seeds suborbicular, keeled, laterally somewhat compressed, dark-brown (dry), papillate, glabrous.

**Additional specimens examined:** Guayas. Terminal Pascuales, Petrocomercial, 1°57'S, 79°53'W, 20 m, Oct 1995 (fl), *Maridueña 003* (GUAY). Nobol, 1°54'S, 80°02'W, 5 m, 21 July 2001 (fl), *Bonifaz & Elao 4233* (GUAY). Samborondón, 1°57'S, 79°53'W, 5 m, 30 September 2001 (fl), *Bonifaz & Elao 4262* (GUAY). Área Nacional de Recreación Parque Samanes, rocódromo, 2°06'S, 79°54'W, 8 m, 21 August 2016 (fl), *Cornejo, Gallardo & Cornejo 8836* (AAU, GUAY, NY, US). Facultad de Ciencias Naturales de la Universidad de Guayaquil, campus Mapasingue, 2°08'S, 79°55'W, 20 m, 27 September 2016 (fl), *Cornejo 8858* (GUAY, NY). Insula Puna, May 1892 (fl), *Eggers 14754* (B).

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FIGURE 1. *Dicliptera francodavilae* Cornejo, Wassh. & Bonifaz. **A**, terminal inflorescence, lateral view; **B**, bilabiate corolla, lateral-adaxial view; **C**, geniculate rachis, lateral view; **D**, detached petals; **E**, leaf blade, abaxial view; **F**, phyllotaxy and branching pattern. **G**, herbaceous habit. A–G: From the holotype (Cornejo *et al.* 8838).



**Habitat and distribution:** *Dicliptera francodavilae* is known from few localities, all found in the disturbed remnants of coastal dry forests in the area of Guayaquil city and surroundings, in the province of Guayas, between 0 and 20 meters above sea level.

**Conservation status:** *Dicliptera francodavilae* has been collected few times, all in disturbed remnant areas in which some native species have persisted after the devastating effect of the urban expansion of the city of Guayaquil. Another threat is the antropogenic fire that is produced every year during the dry season (June to December), in the disturbed seasonal dry areas of the coast of Ecuador. *Dicliptera francodavilae* is apparently conserved in the Área Nacional de Recreación Parque Samanes, that belongs to the National System of Protected Areas of the country, that is known as PANE; however, despite the status, that protected area sometimes could be also under risk of antropogenic fire. Therefore, the preliminary status of Vulnerable VU B1a, b, iii (IUCN, 2012), is assigned to this species.

*Dicliptera francodavilae* is morphologically similar to *D. unguiculata* Nees in Benth. Also from the province of Guayas in Ecuador. The new species is distinguished by having cymule bracteoles narrowly elliptic to elliptic-ob lanceolate, 2–2.5 mm wide, minutely apiculate at apex and densely pilose, inflorescence of terminal rather loose racemes of

umbels to 12 cm long and corollas lilac to purple, 15–25 mm long, pilose without. In contrast, in *D. unguiculata* the cymule bracteoles are obovate to oblanceolate to spatulate, distinctly unequal, 3–5.5 mm wide, spinose-aristate at apex with a mucro 2–3 mm long and pubescent, the inflorescence is of axillary cymes, these often clustered at the branch apices in axils of distal leaves, to 7.5 cm long and corollas rose-pink, 12–17 mm long, pubescent with both glandular and eglandular trichomes.

**Etymology:** The epithet of this taxonomic novelty honors Pedro Franco Dávila (1711–1786), an Ecuadorian naturalist born in Guayaquil, where *Dicliptera francodavilae* occurs, and perhaps the earliest collector of specimens of natural history in the country. Pedro Franco Dávila founded and was the first Director of the *Real Gabinete de Historia Natural* that became the Museum of Natural History in Madrid, Spain. He wrote a guide to collecting plants and other specimens of natural history, that guide was distributed to all officials of the crown in Latin America, that greatly help in the documentation the Neotropical natural richness during the colonial period (Jørgensen and León, 1999; Arellano, 2012).

**Biological interactions:** The flowers are occasionally visited by three species of bees and Lepidoptera during the mornings (Cornejo et al. 8838).

#### LITERATURE CITED

- ARELLANO, V. H. 2012. Don Pedro Franco Dávila. *Boletín del Municipal de Guayaquil*, 12: 30–43.
- IUCN. 2012. IUCN Red List Categories and Criteria Version 4. IUCN Gland, Switzerland, and Cambridge, United Kingdom.
- JØRGENSEN, P. M. AND S. LEÓN, EDS. 1999. *Catalogue of the Vascular Plants of Ecuador*. Monographs in Systematic Botany from the Missouri Botanical Garden 75: 1–118.
- WASSHAUSEN, D. C. 2013. Acanthaceae. Pages 1–328 in C. PERSSON AND B. STAHL, EDS. *Flora of Ecuador Volume 89*. Department of Biological and Environmental Science, University of Gothenburg, Goteborg, Sweden.

Page 124 intentionally left blank.

# NEW COMBINATIONS IN *EUPLOCA* NUTT. (HELIOTROPIACEAE) FROM MEXICO AND CENTRAL AMERICA

JOSÉ IRANILDO MIRANDA DE MELO<sup>1</sup>

**Abstract.** Nine new combinations in *Euploca* (Heliotropiaceae) from Mexico and Central America are proposed in this paper: *Euploca calcicola*, *Euploca cremnogenena*, *Euploca fallax*, *Euploca foliosissima*, *Euploca karwinskyi*, *Euploca limbata*, *Euploca michoacana*, *Euploca queretaroana*, and *Euploca sessei*.

**Resumen.** En este trabajo se proponen nueve nuevas combinaciones en *Euploca* (Heliotropiaceae) de México y Centroamérica: *Euploca calcicola*, *Euploca cremnogenena*, *Euploca fallax*, *Euploca foliosissima*, *Euploca karwinskyi*, *Euploca limbata*, *Euploca michoacana*, *Euploca queretaroana* y *Euploca sessei*.

**Keywords:** Boraginaceae s. l., flora, Neotropics, nomenclature

The genus *Euploca* (Heliotropiaceae) was proposed by Nuttall (1836) and reinstated by Hilger and Diane (2003) based on morphological and molecular data to accommodate the species belonging to *Heliotropium* L. sect. *Orthostachys* R. Br. as well as the species of the genera *Hilgeria* Förther and *Schleidenia* Endl.

According to Diane (2003) species of *Euploca* are distributed in tropical, subtropical and temperate regions, although Melo and Semir (2010) and Melo and Fernández-Alonso (2015) have emphasized that most species of this genus grows in South America and Mexico.

Plants of *Euploca* are herbs or small subshrubs, often decumbent. The inflorescences are bracteate or not, leafy or reduced to solitary flowers; the flowers bear anthers with hairy apex, apically coherent, inserted into the corolla tube. The fruit is dry, separated in four mericarps (schizocarp), each with one seed, presenting two cavities in the abaxial face, and a curved embryo (Hilger and Diane, 2003). Based on The Plant List (2017) and recent works published by Feuillet (2016), Luebert and Frohlich (2016), Feuillet and Hasle (2016, 2017), and Melo (2017), *Euploca* currently encompasses 55 names.

Based on the bracteate inflorescences associated to coherent anthers at the apex and schizocarps separating into four mericarps with a seed in each one, here nine species of *Heliotropium* from Mexico and Central America (including Guatemala), most of them endemics to Mexico (seven spp.), are transfer to *Euploca*.

***Euploca calcicola*** (Fernald) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium calcicola* Fernald, Proc. Amer. Acad. Arts 43: 62. 1907. TYPE: MEXICO. Guerrero, Iguala Canon, Limestone cliffs, 28 September 1905, 2500 feet, C.G. Pringle 10062 (Holotype: GH).

**Distribution:** Mexico.

***Euploca cremnogenena*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium cremnogenum* I.M. Johnst., J. Arnold Arbor. 20(3): 376–377. 1939. TYPE: MEXICO. Michoacán, Huetamo, Mal Paso, Cliffs, G.B. Hinton 8514 (Holotype: K; Isotypes: ARIZ, BM, MO, NY, US).

**Distribution:** Mexico.

***Euploca fallax*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium fallax* I.M. Johnst., J. Arnold Arbor. 18(1): 14–15. 1937. TYPE: GUATEMALA. Departamento de Huehuetenango, 6500 ft. 1950 m alt., 13 December 1934, A.F. Skutch 1922 (Holotype: GH).

**Distribution:** Mexico and Guatemala.

***Euploca foliosissima*** (J.Fr. Macbr.) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium foliosissimum* J.F. Macbr., Proc. Amer. Acad. Arts 51(10): 541–542. 1916. TYPE: MEXICO. Oaxaca, Hacienda Blanca, alt. 5300 ft., 25 July 1895, L.C. Smith 627 (Holotype: GH).

**Distribution:** Mexico and Guatemala.

***Euploca karwinskyi*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium karwinskyi* I.M. Johnst., J. Arnold Arbor. 20: 377. 1939. TYPE: MEXICO. Tamaulipas, Cumbre de Santiaguillo, December 1842, W.F. Karwinsky 646 (Holotype: LE [not seen]; Isotype: Fragment GH).

**Distribution:** Mexico.

***Euploca limbata*** (Benth.) J.I.M. Melo, *comb. nov.*

Basionym: *Heliotropium limbatum* Benth., Pl. Hartw.: 20. 1839. TYPE: MEXICO. Aguascalientes, Aguascalientes, In rupestribus, June 1839, K.T. Hartweg 154 (Holotype: K [not seen]; Isotype: GH).

**Distribution:** Mexico.

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***Euploca michoacana*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*  
 Basionym: *Heliotropium michoacanum* I.M. Johnst., J. Arnold Arbor. 21: 49–50. 1940. TYPE: MEXICO. Michoacán, Coalcoman, Barroloso, 1300 m, 7 August 1839, *G.B. Hinton 15069* (Holotype: GH; Isotype: GH).

**Distribution:** Mexico.

***Euploca queretaroana*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*  
 Basionym: *Heliotropium queretaroanum* I.M. Johnst., J. Arnold Arbor. 29: 230. 1948. TYPE: MEXICO.

Queretaro, near Higuerillas, 23 August 1905, *G.P. Rose, L.S. Painter & L.C. Rose 9800* (Holotype [not seen]; US; Fragment + Photo: AA).

**Distribution:** Mexico.

***Euploca sessei*** (I.M. Johnst.) J.I.M. Melo, *comb. nov.*  
 Basionym: *Heliotropium sessei* I.M. Johnst., J. Arnold Arbor. 18: 13. 1937. TYPE: MEXICO. Hidalgo, Ixmiquilpan, Sierra de La Mesa, July 1905, *C.A. Purpus 1402* (Holotype: GH).

**Distribution:** Mexico.

#### LITERATURE CITED

- DIANE, N. 2003. Systematic analysis of the Heliotropiaceae based on molecular and morphological-anatomical data. Ph.D. diss., Department of Biology, Chemistry and Pharmacy, Freie Universität, Berlin.
- FEUILLET, C. 2016. Two new combinations in *Euploca* Nutt. (Heliotropiaceae, Boraginales) and a conspectus of the species of the Guiana Shield area. *Phytokeys* 61: 101–124. Downloadable from <https://doi.org/10.3897/phytokeys.61.6260> (accessed March 31, 2017).
- FEUILLET, C. AND R. R. HASLE. 2016. New combinations from *Heliotropium* to *Euploca* (Boraginales: Heliotropiaceae). *Phytoneuron* 5: 1–3. Downloadable from <http://www.phytoneuron.net/2016Phytoneuron/5PhytoN-Euploca.pdf> (accessed March 31, 2017).
- FEUILLET, C. AND R. R. HASLE. 2017. New combinations for *Heliotropium powelliorum* and *Heliotropium pringlei* in the genus *Euploca* (Boraginales: Heliotropiaceae). *Phytoneuron* 5: 1–3. Downloadable from <http://www.phytoneuron.net/2017Phytoneuron/05PhytoN-EuplocaCombinations.pdf> (accessed March 31, 2017).
- HILGER, H. H. AND N. DIANE. 2003. A systematic analysis of Heliotropiaceae (Boraginales) based on trnL and ITS1 sequence data. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 125: 19–51. Downloadable from <http://dx.doi.org/10.1127/0006-8152/2003/0125-0019> (accessed April 16, 2017).
- LUEBERT F. AND M. W. FRÖHLICH. 2017. Four new combinations in Argentinian Heliotropiaceae. *Darwiniana, nueva serie* 4: 192–194. Downloadable from <http://dx.doi.org/10.14522/darwiniana.2016.42.717> (accessed March 31, 2017).
- MELO, J. I. M. 2017. New combinations in *Euploca* (Heliotropiaceae) from Mexico. *Revista Mexicana de Biodiversidad* 88(3): 759–760. Downloadable from <http://www.revista.ib.unam.mx/index.php/bio/article/view/1877/1558> (accessed October 9, 2017).
- MELO, J. I. M. AND J. L. FERNÁNDEZ-ALONSO. 2015. A new combination and new synonym in the Neotropical Heliotropiaceae. *Phytotaxa* 222: 162–164. Downloadable from <http://dx.doi.org/10.11646/phytotaxa.222.2.11> (accessed April 16, 2017).
- MELO, J. I. M. AND J. SEMIR. 2010. Taxonomia do gênero *Euploca* Nutt. (Heliotropiaceae) no Brasil. *Acta Botanica Brasilica* 24: 111–132. Downloadable from <http://dx.doi.org/10.1590/S0102-33062010000100012> (accessed April 16, 2017).
- NUTTALL, T. 1836. Collections towards a flora of the Territory of Arkansas. *Transactions of the American Philosophical Society Held at Philadelphia for Promoting useful Knowledge* 5: 139–203.
- THE PLANT LIST: A working list of all plant species 2017. *Euploca*. In Boraginaceae. Downloadable from [www.theplantlist.org/tpl1.1/search?q=Euploca](http://www.theplantlist.org/tpl1.1/search?q=Euploca) (accessed October 9, 2017).



# MUSSAENDA REFLEXISEPALA, A NEW SPECIES OF RUBIACEAE FROM VIETNAM

VAN DUY NONG<sup>1</sup> AND TAO CHEN<sup>2,3</sup>

**Abstract.** A new species of Rubiaceae from South Central Vietnam is described and illustrated. The new species, *Mussaenda reflexise-pala*, is similar to *M. caudatiloba* in young plant parts densely white villose, but different in calyx lobes recurved, obviously reflexed, corolla lobes yellow to orange or reddish orange, ovate to broadly obovate, which are clearly distinguished from other known species of *Mussaenda*. The pollen morphology of *Mussaenda reflexise-pala* is also reported.

**Keywords:** *Mussaenda reflexise-pala*, Rubiaceae, Pollen morphology, new species, Vietnam

The genus *Mussaenda* Burm. ex L. s. str. (Rubiaceae; Alejandro *et al.*, 2005) is a paleotropical group of ca. 135 species widespread in tropical Africa, Asia and Pacific islands, with ca. 27 species occurring in Vietnam (Ho, 1999; Ban, 2005). Species in *Mussaenda* are usually characterized by the enlarged petaloid calycophylls, the reduplicate-valvate corolla aestivation, the indehiscent, berry-like fruits, the numerous, minute, reticulate seeds, and such habit as small trees, erect or scandent shrubs, rarely suffrutices or epiphytes (Cheek, 2009).

During our field work in 2010 and 2011, having as

ultimate goal a taxonomic revision of the genus, we collected some peculiar specimens of *Mussaenda* in the Hon Ba Nature Reserve, Cam Lam District, Khanh Hoa Province, South Central Vietnam. After having examined specimens in several mayor herbaria (BM, E, IBSC, K, KUN, PE, HN, VNM) and consulting the relevant literature (Chen *et al.*, 2011; Ho, 1999; Ban, 2005), we found them to be similar to yet different from *Mussaenda caudatiloba* D. Fang (2002). Therefore, we concluded that the plants from Hon Ba Nature Reserve represent a hitherto undescribed species, which we describe and illustrate herein.

## MATERIAL AND METHODS

**Field work.** Field expeditions were undertaken by the authors respectively in 2010 in Khanh Hoa Province, Vietnam and also in 2011 in Ninh Thuan Province, Vietnam. The measurements and other details given in the description are based on field observations as well as herbarium specimen measurements under a stereo microscope (Olympus SZX7). The RHS colour chart was used for the colour references (RHS, 2015).

**Pollen material.** Samples were taken from specimens collected in areas in Khanh Hoa. Vouchers were deposited in the herbarium of Tay Nguyen Institute for Scientific

Research (VTN), Vietnam Academy of Sciences and Technology, Da Lat, Vietnam as well as the herbarium of Shenzhen Fairy Lake Botanical Garden (SZG), the Chinese Academy of Sciences, China. Dried pollen was acetolysed following Erdtman (1969), then suspended in 70% ethyl alcohol after washed, air dried on brass stubs and coated with gold palladium, and observed under a JSM-6360LV scanning electron microscope (SEM). Twenty pollen grains per sample were measured. Palynological terminology follows Erdtman (1952) and Faegri and Iversen (1989).

## RESULTS AND DISCUSSION

**Morphological observation.** At first glance *M. reflexise-pala* somewhat resembles *M. caudatiloba* in that young plant parts are densely whitish villose. Nonetheless, upon careful examination of the specimens, it is clear that they are different species. The calyx lobes of *Mussaenda reflexise-pala* are narrowly lanceolate, obviously recurved and reflexed, (vs. linear, spreading in *M. caudatiloba*) and the corolla lobes are yellow to orange or reddish orange,

ovate to broadly obovate, cuspidate (vs. orangish yellow, triangular-lanceolate, caudate in *M. caudatiloba*) (Table 1).

**Microscope observations of pollen.** The pollen grains are single, isopolar, radially symmetrical, suboblate or subspheroidal in shape, the exine ornamentation is finely rugulose, 4-colporate and sized  $12.5 \times 13.5 \mu\text{m}$  to  $14.25 \times 16.25 \mu\text{m}$ . The colporate aperture ovate to circular sized  $1.75 \times 2.5 \mu\text{m}$  to  $3.75 \times 2 \mu\text{m}$ .

We are thankful to the managers of the Hon Ba Nature Reserve, Khanh Hoa Province, Vietnam, for their kind help in arranging field surveys, to the curators of the herbaria (BM, E, IBSC, K, KUN, PE, HN, VNM) for providing facilities and access to collections, especially to Sally Dawson (K), Lesley Scott (E) and Ramee Prakash (BM) for their helpful assistance, and to the anonymous reviewers for their comments which help improve the manuscript. Thanks also due to Ms. Yun-Xiao Liu for the illustrations. This work was supported by Technique Development Project of Shenzhen Technology Innovation Programs (CXZZ2014093154251302, T. Chen), Development Program of Shenzhen Strategic Emerging Industries (JC201104210142A, T. Chen), National Natural Science Foundation of China (Grant No. 31620103902) and Science and Technology Basic Work (Grant No. 2013FY112100), Shenzhen Fairy Lake Botanical Garden, Chinese Academy of Sciences, and Tay Nguyen Institute for Scientific Research, Vietnam Academy of Sciences and Technology, for which the authors are profoundly grateful.

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TABLE 1. A morphological comparison between *Mussaenda reflexisepala* and *Mussaenda caudatiloba*.

Characters	<i>MUSSAENDA REFLEXISEPALA</i>	<i>MUSSAENDA CAUDATILOBA</i>
<b>Leaf</b>	narrowly elliptic to lanceolate, 1.2–13.3 × 0.8–4.5 cm, base cuneate, apex acuminate	ovate to lanceolate, 4–11 × 2–5 cm, base rounded to rarely cordate, apex acuminate to subcaudate,
<b>Petiole</b>	2–5 mm long	5–10 mm long
<b>Inflorescence</b>	flowers lax; peduncle 1–4 cm long; bract triangular, 3–5 mm long	flowers congested; peduncle 0.5–1 cm long; bracts linear, ca. 8 mm long
<b>Calyx lobe</b>	narrowly lanceolate, recurved, obviously reflexed, 5–7 mm long	linear, straight, spreading, 1–1.3 cm long
<b>Calycophyll</b>	blade ovate or irregular ovate, 3–6 × 2.5–4.5 cm, base broadly cuneate, apex acuminate, stipe 1.5–2.0 cm long	blade ovate, 5–6.7 × 3–5.3 cm, base rounded, apex acute, stipe 1.8–2.5 cm long
<b>Corolla lobe</b>	ovate to broadly obovate, yellow to orange or reddish orange above, 5–6.5 mm long, apex cuspidate	triangular-lanceolate, orangish yellow, ca. 8 mm long, apex caudate, incurved

## DESCRIPTION OF NEW SPECIES

***Mussaenda reflexisepala*** T. Chen & V. D. Nong *sp. nov.*  
 TYPE: VIETNAM. Ninh Thuan Province: Ninh Son District, Song Pha pass mountain, 11°50'22.1"N, 108°40'45.7"E, 648 m, 09 July 2011, N.V. Duy 780 (Holotype, VTN; Isotype, SZG). Fig. 1, 2.

*Mussaenda reflexisepala* is similar to *Mussaenda caudatiloba* in having young plant parts densely villose. It differs from *Mussaenda caudatiloba* in having calyx lobes recurved, obviously reflexed, and corolla lobes yellow to orange or reddish orange above, ovate to broadly obovate, which are distinct from all known *Mussaenda* species.

Climbing *shrubs*, 2–3 m high, young branches terete or angulate, densely white villose, gradually brownish when mature and glabrescent when old. Stipules triangular-lanceolate, deeply bifid, acuminate, 0.7–1 cm long. *Leaves* opposite; *petiole* 0.2–0.5 cm long, densely white villose; *blade* drying thinly papery, dark green adaxially, pale abaxially, elliptic, 1.2–13.3 × 0.8–4.5 cm, densely white villose with denser pubescence along veins, margin entire, base cuneate, apex acuminate; secondary veins 8–10 pairs, arc ascending, prominent beneath. *Inflorescences* cymose, pauciflorous, terminal, peduncle 1–4 cm long; flowers lax, *pedicel* 1 mm long; bract triangular, 3–5 mm long, densely white villose; calyx lobe 5(–6), green, narrowly lanceolate, acute, recurved, obviously reflexed, 0.5–0.7 cm long, 1.5 mm wide at base, pilose adaxially, villose abaxially; *calycophylls* white, blade sparsely pilose adaxially, villose abaxially, ovate or irregularly ovate, 3–6 × 2.5–4.5 cm, apex acuminate, base broadly cuneate, longitudinal veins 6, densely villose abaxially, stipe 1.5–2.0 cm long. *Corolla* tube slender, densely white villose outside, 2.0–2.5 cm long, ampliate part 1.0–1.3 cm long, densely yellow clavate pubescent inside; *corolla lobes* yellow to orange or reddish orange adaxially, ovate to broadly obovate, cuspidate at

apex, 5–6.5 mm long, sparsely villose abaxially. *Stamens* 5, inserted at 1/6 near the base of the corolla tube, *filament* glabrous, 5 mm long, *anther* linear, 4.5–5 mm long. *Style* glabrous, heterostylous, long style ca. 19 mm long, short style ca. 4 mm long, *stigma* bifid, glabrous, 4–8 mm long. *Berry* densely white villose, elliptic to oblong, 12–20 × 8–11 mm, *pedicel* 1–3 mm, *seeds* numerous, minute, ca. 0.8 mm long, brown, surface reticulate.

**Phenology:** Flowers June to August; fruits August to October.

**Distribution and ecology:** *Mussaenda reflexisepala* has been collected from two localities in Vietnam, Hon Ba, Suoi Dau, Cam Lam District in Khanh Hoa Province, and Song Pha, Ninh Son District in Ninh Thuan Province. It grows sporadically on scrub roadside of the evergreen secondary forest, accompanied with *Thysanolaena maxima* (Poaceae), *Rubus sp.* (Rosaceae), *lantana sp.* (Verbenaceae), etc. This species have both long-styled and short-styled flowers which bear fruits with fertile ovaries. The changing color of corolla lobes may significant contribute to the pollination and fruition of the new species confined to narrow areas in the Hon Ba Nature Reserve.

**Etymology:** The specific epithet refers to the unique morphology of calyx lobes obviously reflexed in flowers and fruits.

**Additional specimens examined:** VIETNAM. Khanh Hoa Province: Cam Lam District, Suoi Dau, Hon Ba, 12°06'30"N, 108°59'14"E, 627, 20 August 2010, N.V. Duy 610 (VTN!); Same locality, 30 August, 2011, N.V. Duy 850 (VTN!). Khanh Hoa Province: Cam Lam District, in disturbed vegetation along the road at the base of Hon Ba Nature Reserve, 12°07'52"N, 109°00'47"E, 221 m, 7 July 2011, Leong-Skornickova J., Rybkova R., Tran H.D., Truong D.V., Ponert J. HB128 (E!).

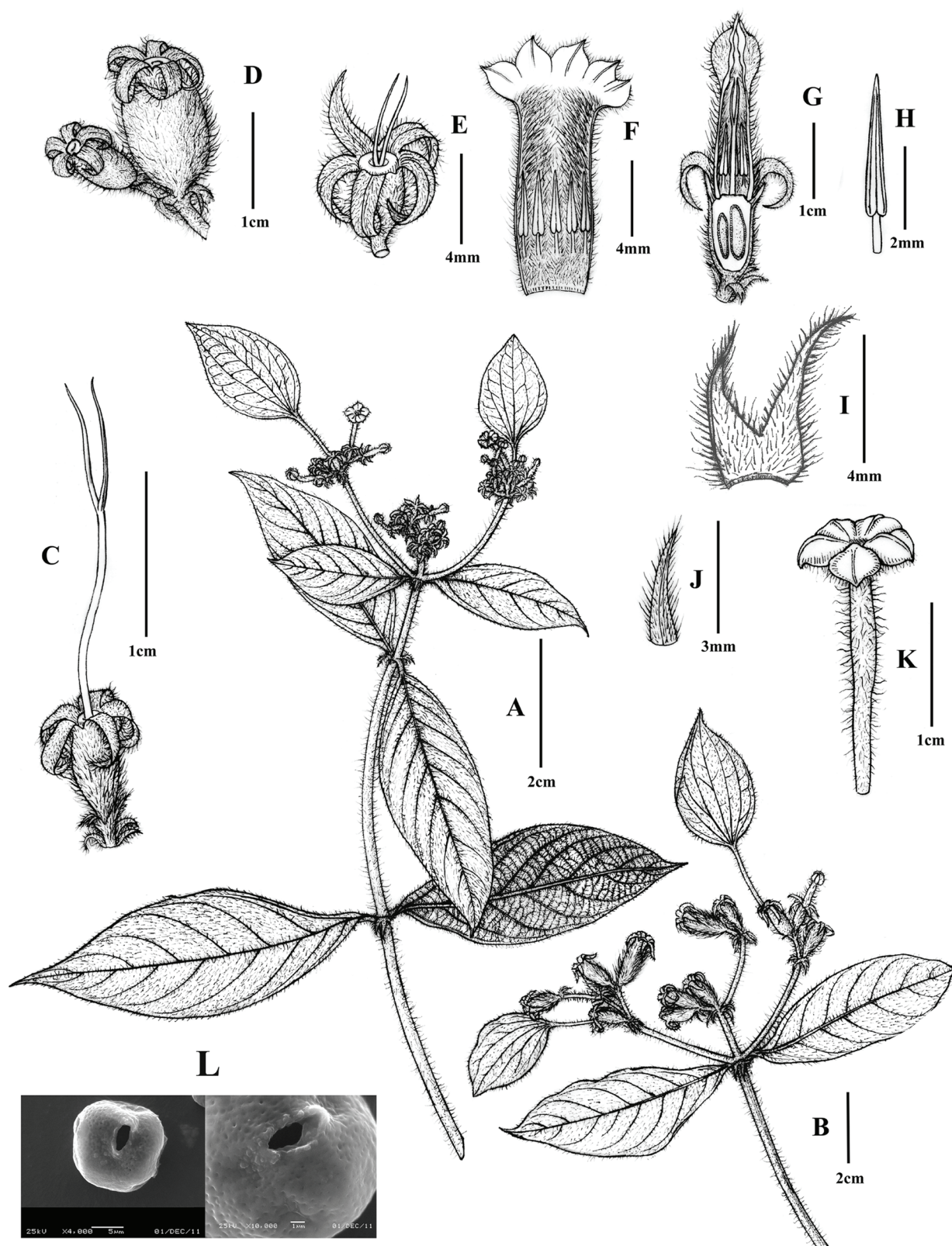


FIGURE 1. *Mussaenda reflexisepala* T. Chen & V. D. Nong. **A**, flowering branch; **B**, fruiting branch; **C**, calyx and long style; **D**, fruits; **E**, calyx and short style; **F**, corolla opened showing stamens; **G**, calyx and corolla opened showing stamens and pistil; **H**, anther; **I**, stipule; **J**, bract; **K**, corolla; **L**, pollen and view showing colporate aperture. Drawn by Y. X. Liu based on the holotype.



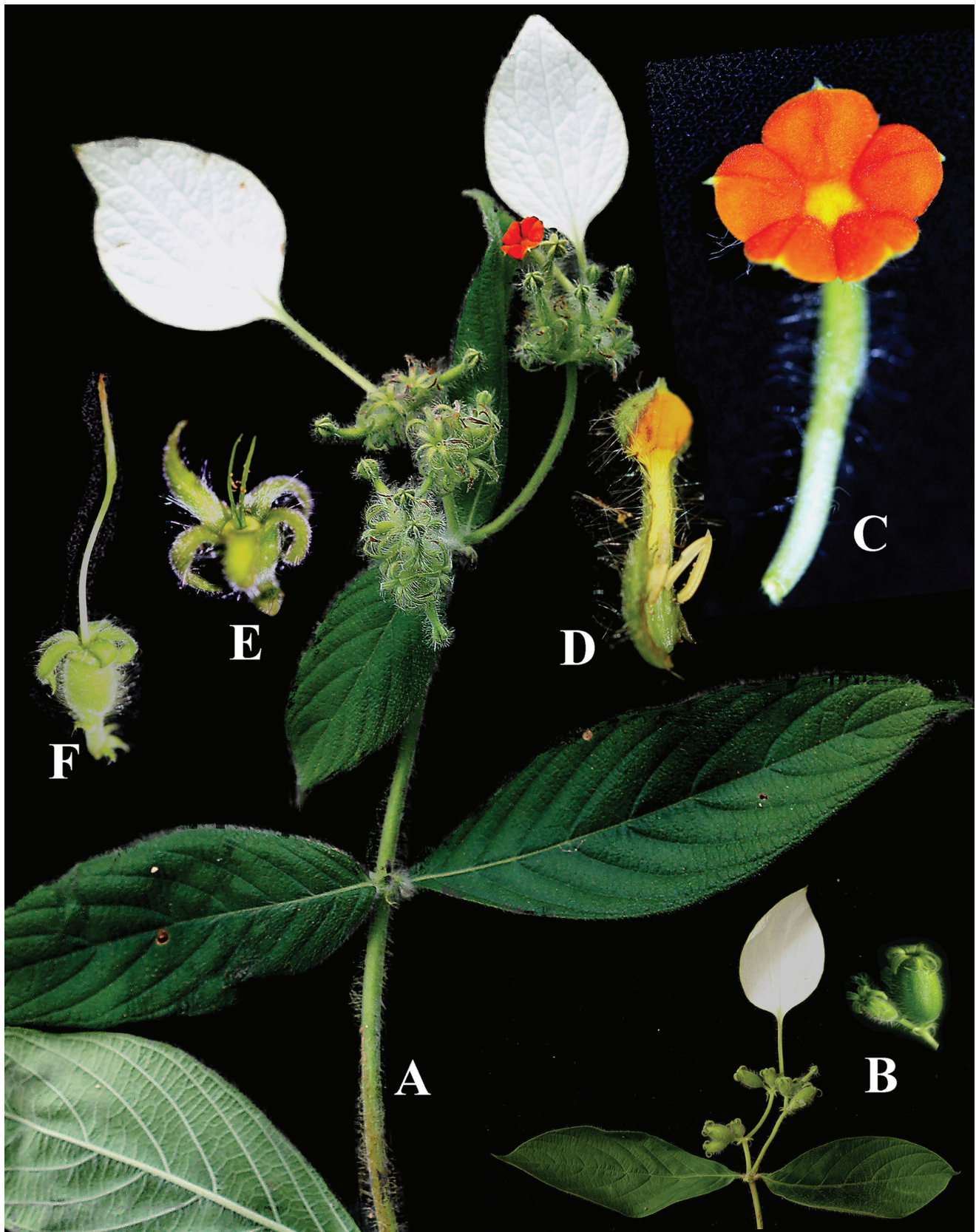


FIGURE 2. *Mussaenda reflexisepala* T. Chen & V. D. Nong. **A**, flowering branch; **B**, fruits branch; **C**, corolla lobes; **D**, corolla opened and stamens; **E**, calyx and short style; **F**, calyx and long style. Photographs by V. D. Nong based on the holotype.



## LITERATURE CITED

- ALEJANDRO, G. D., S. G. RAZAFIMANDIMBISON, AND S. LIEDE-SCHUMANN. 2005. Polyphyly of *Mussaenda* inferred from ITS and trnT-F data and ITS implication for generic limits in Mussaendeae (Rubiaceae). *American Journal of Botany* 92: 544–557.
- BAN, N. T. 2005. *Danh lục các loài thực vật Việt Nam*. 3: 128. NXB. Nong Nghiep, Ha Noi.
- CHEEK, M. 2009. *Mussaenda epiphytica* sp. nov. (Rubiaceae), an epiphytic shrub from cloud forest of the Bakossi Mts, western Cameroon. *Nordic Journal of Botany* 27:456–459.
- CHEN, T. AND C. M. TAYLOR, 2010. *Mussaenda*. Pages 231–242 in Z. Y. WU, P. H. RAVEN, AND D. Y. HONG, EDS. *Flora of China*, Vol. 19. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- ERDTMAN, G. 1952. *Pollen Morphology and Plant Taxonomy-Angiosperms*. Almqvist & Wiksell, Stockholm.
- . 1969. *Handbook of palynology*. Munksgaard, Copenhagen.
- FAEGRI, K. AND J. IVERSEN. 1989. *Textbook of Pollen Analysis* (4th edn by FAEGRI, K., P. E. KALAND, AND K. KRZYWINSKI). John Wiley & Sons. Chichester, West Sussex, England.
- FANG D. AND Z. M. XIE. 2002. Three new species of the Rubiaceae from Guangxi, China. *Acta Phytotax. Sin.* 40(2): 154–157.
- HO, P. H. 1999. *An Illustrated Flora of Vietnam*. 3: 145–151. Youth Publishing House, Tp. Ho Chi Minh.
- RHS. 2015. *Royal Horticulture Society Colour Chart*, 6th ed. RHS Media, Royal Horticulture Society, London.

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# ZYGOSTATES LUERORUM—A NEW SPECIES FROM BOLIVIA IN THE ORNITHOCEPHALUS CLADE OF SUBTRIBE ONCIDIINAE (ORCHIDACEAE)

A. L. V. TOSCANO DE BRITO<sup>1</sup>

**Abstract.** A new species of *Zygostates* from Cochabamba, Bolivia, is described and illustrated. It is similar to *Zygostates apiculata* (Lindl.) Toscano, but differs by the distinctly callose sepals, petals, and labellum.

**Resumen.** Se describe y se ilustra una nueva especie de *Zygostates* de Cochabamba, Bolivia. La nueva especie se asemeja a *Zygostates apiculata* (Lindl.) Toscano, pero se diferencia por tener los sépalos, pétalos y el labelo callosos.

**Keywords:** Orchidaceae, *Zygostates*, Taxonomy, South America

*Zygostates* Lindl. is a genus of the *Ornithocephalus* clade of subtribe Oncidiinae (Orchidaceae). It comprises about 25 epiphytic species distributed in the South American tropics, from Venezuela, Colombia, Suriname, French Guiana, Ecuador, and Peru to southern Brazil, Bolivia, Paraguay, and Argentina, of which five species have been previously reported from Bolivia (Toscano de Brito, 2012). In the course of preparing a taxonomic revision of *Zygostates*, a new species from Cochabamba, Bolivia, was discovered. It is described and illustrated here.

***Zygostates luerorum*** Toscano & R. Vásquez, *sp. nov.*  
TYPE: BOLIVIA. Cochabamba: dry forest remnant along road north of Cocapata, 2100 m, 5 February 1997, C. Luer, J. Luer and R. Vásquez 18390 (Holotype: SEL [113691]). Fig. 1.

This species is similar to *Zygostates apiculata* (Lindl.) Toscano, but differs by the distinctly callose sepals, petals, and labellum.

*Plant* to ca. 40 mm tall, epiphytic, caespitose; roots slender, several, terete, flexuous, glabrous. *Pseudobulbs* 3–6 × 3 mm, subglobose or ellipsoid, clustered, unifoliate, usually concealed by the lateral leaves. *Lateral leaves* few (3–5), attenuate at base, slightly or distinctly petiolate, articulate, sheathing at base, the blade 10–30 × 4–6 mm, elliptic, or lanceolate to oblong-lanceolate, thick, rigid, acute, shortly apiculate, abaxially slightly keeled, adaxially slightly sulcate, yellowish-green (*fide* collection data); leaf-sheaths 3–5 mm long. *Apical leaf* similar to the lateral ones, lacking a leaf-sheath. *Inflorescence* to ca. 50 mm long, to ca. 10-flowered, racemose, emerging from the base of the pseudobulb, erect; peduncle short to c. 12 mm long, somewhat angular in cross-section, glabrous, covered by 3–5 narrowly ovate to subtriangular, concave, acute sterile bracts 2.5–3 × 1.5 mm; rachis to c. 20 mm long, somewhat twisted and flexuous, angular in cross-section, glabrous; floral bracts similar to the sterile ones, relatively smaller and

decreasing in size toward the apex of inflorescence. *Flowers* greenish-yellow (*fide* collection data), resupinate or non-resupinate, patent, with labellum facing the rachis. *Pedicel* ca. 4 mm long, twisted, angular in cross-section, geniculate at apex. *Ovary* ca. 1.5 mm long, slightly ridged in cross-section. *Dorsal sepal* 4 × 2 mm, oblong, slightly convex, usually reflexed, slightly oblique, abaxially obscurely keeled on the midvein, margins entire, apex obtuse. *Lateral sepals* c. 4 × 2 mm, oblique, slightly falcate, oblong-ovate, slightly concave and incurved toward apex, the adaxial surface obscurely callose at base, abaxially similarly keeled as the dorsal one, the margins entire, the apex obtuse. *Petals* 3.0–3.5 × 4 mm, broadly obovate, symmetric or slightly oblique, spreading, the base shortly unguiculate, adaxially provided with a number of fleshy, dentate callosities, the margins entire at base, irregularly erose-dentate toward the rounded apex. *Labellum* 3 × 2 mm, elliptic, concave, slightly incurved at the apex, thickish, abaxially obscurely keeled on the midvein, the base adaxially glandular, hollowed, the adaxial surface of the labellum provided with two longitudinal, parallel callosities that run from near the base to just above the middle of the labellum, flanked by two lower and shorter callosities on each side, apex of the labellum hollowed, slightly incurved, obtuse. *Column* ca. 2 mm long (excluding the rostellum), lacking lateral appendages at base, the base terete, bearing a rounded stigmatic cavity above, the mid-portion dorsiventrally flattened to the level of the clinandrium, sigmoid, and geniculate near the dilated apex; rostellum conspicuous, ca. 2 mm long, slightly dilated at base, markedly curved upward, subulate, dorsiventrally flattened, obtuse; anther ca. 1 mm long, operculate, much shorter than the rostellum when placed on the column, rotund, shortly beaked, the beak recurved and parallel to the rostellum, obtuse; pollinia arranged in two superposed, subglobose, equal pairs; stipe ca. 2.5 mm long, narrow, elongate, abruptly dilated near the point of attachment of the pollinia; viscidium oblong-elliptic. Capsule not seen.

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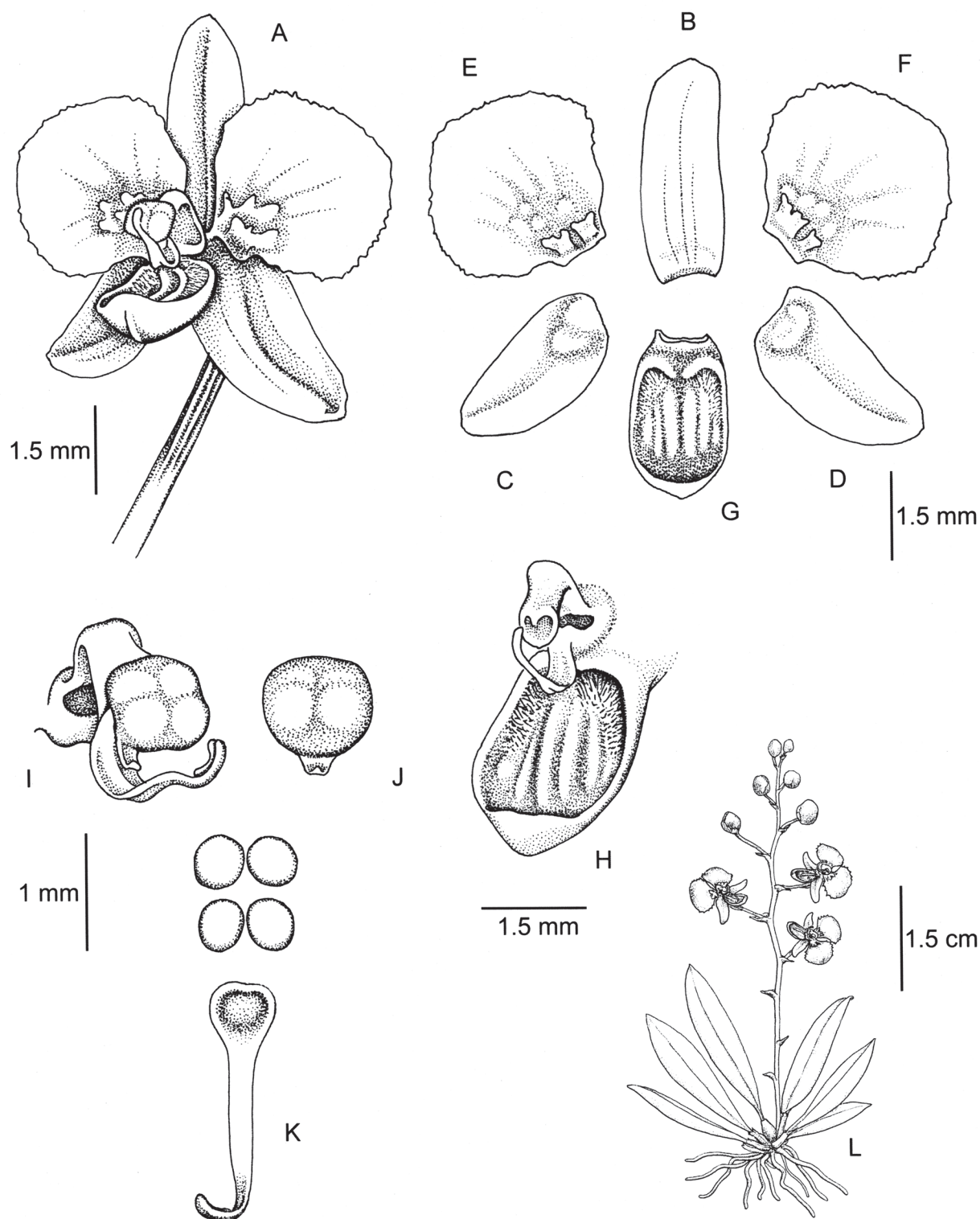


FIGURE 1. *Zygostates luerorum* Toscano & R. Vásquez. **A**, Flower in  $\frac{3}{4}$  view; **B**, Dorsal sepal; **C–D**, Lateral sepals; **E–F**, Petals; **G**, Labellum; **H**, Labellum and column, anther removed; **I**, Column with anther in place; **J**, Anther, front view; **K**, Pollinarium in front view and spread; **L**, Habit. A–K drawn by Stig Dalström, based on the holotype (*C. Luer, J. Luer and R. Vásquez 18390*); L drawn by Susanna Stuart-Smith, based on an illustration by R. Vásquez of a cultivated clone of the type collection.



**Habitat and distribution:** *Zygostates luerorum* grows epiphytically in ecotonal forest (transition between semi-deciduous and rain forests) at 2100 m elevation in the department of Cochabamba, Bolivia.

**Etymology:** Named in honor of Carlyle and Jane Luer, two of the discoverers of this species.

*Zygostates luerorum* is similar to *Z. apiculata* from which it is distinguished by the morphology of sepals, petals

and labellum. In *Zygostates luerorum* sepals and petals are callose at base and the labellum is provided with a number longitudinal callosities on the adaxial surface, whereas in *Z. apiculata* sepals, petals and labellum are smooth, and the labellum lacks obvious longitudinal callosities on the adaxial surface. The new species is known only from the type collection but it is distinctive enough to be described as a new taxon.

#### LITERATURE CITED

TOSCANO DE BRITO, A. L. V. 2012. A new species and a new combination in *Zygostates* (Orchidaceae: Oncidiinae) from Bolivia. Kew Bull. 67: 1–3.

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# TYPIFICATION AND NOMENCLATURE OF FIVE TAXA ENDEMIC TO JAMAICA

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KENNETH J. WURDACK,<sup>5</sup> JAVIER FRANCISCO-ORTEGA,<sup>6,7</sup> AND BRETT JESTROW<sup>7</sup>

**Abstract.** Recent systematic treatments for Jamaica have shown that the island is home to seven endemic genera of seed-plants [viz., *Dendrocousinsia* (Euphorbiaceae), *Jacmaia* (Asteraceae), *Odontocline* (Asteraceae), *Portlandia* (Rubiaceae), *Salpixinantha* (Acanthaceae), *Tetrasiphon* (Celastraceae), and *Zemisia* (Asteraceae)]. These taxa account for over 23 species, with three genera (*Jacmaia*, *Tetrasiphon*, and *Zemisia*) being monotypic. Further study of these taxa revealed that five names need typification: (1) *Tetrasiphon jamaicensis* Urb.; (2) *Senecio fadyenii* Griseb.; (3) *S. fadyenii* var. *dolichanthus* Krug & Urb.; (4) *S. hollickii* Britton ex Greenm. [all the three *Senecio* taxa included in *Odontocline*]; and (5) *Gymnanthes elliptica* Sw. Lectotypes for these names are designated here. Furthermore, *G. elliptica* is transferred to *Dendrocousinsia* and the new combination is made here: *D. elliptica* (Sw.) Commock & K. Wurdack.

**Keywords:** Caribbean Islands, tropical islands, nomenclature, taxonomy, systematics

The Caribbean Island Biodiversity Hotspot has about 180 endemic genera of seed-plants, including seven restricted to Jamaica [i.e., *Dendrocousinsia* Millsp. (Euphorbiaceae), *Jacmaia* B. Nord. (Asteraceae), *Odontocline* B. Nord. (Asteraceae), *Portlandia* P. Browne (Rubiaceae), *Salpixinantha* Hook. (Acanthaceae), *Tetrasiphon* Urb. (Celastraceae), and *Zemisia* B. Nord. (Asteraceae)]. These seven genera contain over 23 species (Francisco-Ortega et al., 2007, 2008; Acevedo-Rodríguez & Strong, 2012; Herrera Oliver & González Gutiérrez, 2013).

The plant genera restricted to Jamaica received significant attention by Bretting (1983 a, b), who provided brief descriptions, photographs, illustrations, and distribution reviews for each genus. His work represented the first comprehensive summary for important components of the flora of this island. As part of her Ph.D. research at the University of the West Indies, Commock will present an update of Bretting's (1983 a, b) studies that will include a review of the taxonomic treatments, nomenclature, and typification of these genera. The latest comprehensive floristic treatments for Jamaica were published by Adams (1972) and by Proctor (1982), but they did not address the nomenclature and typification of names associated with these endemic genera.

The research conducted so far has revealed that types have not been assigned or have not been clearly discussed for five names that are currently associated with the endemic genera *Dendrocousinsia* (*Gymnanthes elliptica* Sw.), *Tetrasiphon* (*T. jamaicensis* Urb.), and *Odontocline*

(*Senecio fadyenii* Griseb., *S. fadyenii* var. *dolichanthus* Krug & Urb., and *S. hollickii* Britton ex Greenm.). Furthermore, *G. elliptica* has not been taxonomically accommodated into *Dendrocousinsia*. In this study, we formally transfer *G. elliptica* to *Dendrocousinsia* and make the new combination *D. elliptica* (Sw.) Commock & K. Wurdack.

The authors have reviewed the literature and examined herbarium specimens; following the International Code of Nomenclature (ICN) for algae, fungi, and plants (McNeill et al., 2012), we herewith present five typifications, nomenclature treatments, and one new combination here. The herbaria consulted for this research include BM, J, K, UCWI and US. Digital images were reviewed for relevant collections at B, GOET, NY, P, and S. These electronic images were either sent to us by special requests or remotely accessed from the internet.

The five names that are the subject of this study are arranged alphabetically by the endemic genus wherein they are currently placed. This is followed by a brief discussion justifying the typifications and providing relevant taxonomic and systematics information.

**1. *Dendrocousinsia elliptica* (Sw.) Commock & K. Wurdack, comb. nov.** = *Gymnanthes elliptica* Sw., Prodr.: 96. 1788. = *Sebastiania elliptica* (Sw.) Müll. Arg., Prodr. 15(2): 1181. 1866. = *Ateramnus ellipticus* (Sw.) Rothm., Feddes Repert. Spec. Nov. Regni Veg. 53: 5. 1944. = *Excoecaria tinifolia* Sw., Fl. Ind. Occid. 2: 1119. 1800, nom. superfl. & illeg. = *Gymnanthes obtusa* Baill., Étude Euphorb.: 530. 1858, nom. inval.

This study is part of the Ph.D. research of the senior author [under the academic supervision of Philip Rose (PER) and Javier Francisco-Ortega (JFO)], and it is framed within the official institutional agreement established between the University of the West Indies (UWI) and Florida International University (FIU). We are grateful to the FIU Kimberly Green Latin American and Caribbean Center for supporting the academic visit made by PER to FIU and FTBG to set up the academic foundations of this study. Tracy Commock's research visits to Miami have received the support of the Postgraduate Research Fund, UWI (Mona Campus), the Mohamed Bin Zayed Species Conservation Fund (grant number to 12254431 to TC), Fairchild Tropical Botanic Garden and the Montgomery Botanical Center. This is contribution 350 from the Tropical Biology Program of FIU.

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Described from: “Jamaica”

Lectotype (designated here): “a celeb. D. Doct. Ol. Swartz,” *O. Swartz s.n.* (S11-341); isoelectotypes: G-DC, BM? BR?

Molecular phylogenetic research coupled with morphological studies clearly supports that the Jamaican endemic *Gymnanthes elliptica* should be transferred to *Dendrocousinsia* (Commock et al., in prep.; Wurdack, in prep.). A new combination to accommodate *G. elliptica* in *Dendrocousinsia* is needed, and it is presented here. Additional molecular systematic studies have also shown that *Gymnanthes* (~ 45 spp.), as currently circumscribed (Esser, 2001), is polyphyletic (Wurdack, in prep.).

*Gymnanthes*, as originally proposed, consisted of two species, viz., *G. elliptica* and *G. lucida*, and of these two names, *G. elliptica* was the first cited species in sequence (Swartz, 1788). Prior to the 2017 International Botanical Congress (held in Shenzhen, China), it was generally accepted that the type species of *Gymnanthes* was *G. elliptica* [as designated by Britton & Shafer (1908: 600)]. As far as we are aware, no taxonomic treatment has assigned *G. elliptica* as the type species for *Gymnanthes* prior to Britton & Shafer (1908: 600); their typification, however, could be considered as largely mechanical as elaborated below (also see ICN Art. 10 Ex. 7).

In the July 2017 Shenzhen congress, the Nomenclature Session approved a set of proposals from John McNeill et al. (2016) pertaining to generic typifications made by Britton and his associates (Turland & Wiersema, 2017: 234). Two of the accepted proposals are quoted here: (1) “A type selection made under a largely mechanical method is superseded by any later choice of a different type not made under that method, unless, in the interval, the supersedable choice has been affirmed in a publication that did not use a mechanical method of selection.” and (2) “The following criteria determine whether a particular publication, appearing prior to 1 January 1935, has adopted a largely mechanical method of type selection: (a) any statement to that effect, including that the American Code or the “Philadelphia Code” was being followed or that types were determined in a particular mechanical way (e.g. the first species in order)... (e) if an author of the publication was an employee or a recognized associate of the New York Botanical Garden; or (f) if an author of the publication was an employee of the United States government.”

It has been a known fact that Britton and Shafer were employees of the New York Botanical Garden and that they practiced the then existed American Code, which advocated to choose the first species in order as the type for a genus name. This pattern of type selection is evident throughout Britton & Shafer’s (1908) North American trees adding weight to our specific contention that their choice of *Gymnanthes elliptica* as the genus name type (Britton & Shafer, 1908: 600) was made under the mechanical method of the American Code and that *G. elliptica* cannot be the type species for *Gymnanthes*. Moreover, Webster (1967: 388) assigned the widespread Neotropical *G. lucida* Sw. as the type for *Gymnanthes*. From what we have found,

prior to Webster’s contribution, no taxonomic treatment had assigned *G. elliptica* or *G. lucida* as the type species for *Gymnanthes*, with the exception of the aforementioned publication by Britton & Shafer (1908).

Some works including those by Webster himself (Webster, 1967: 388, 1994: 122) considered Grisebach (1859: 50) as the type species designator for *Gymnanthes*, indeed it seems that Webster (1967: 388) was not aware that he was typifying this genus as in his work he stated: “Lectotype species: *G. lucida* Sw.; typification effected by Grisebach, Fl. Brit. W. Indian Is. 50. 1859.” Although Grisebach included *G. lucida* as the single species for *Excoecaria* sect. *Gymnanthes* (Sw.) Griseb., he, however, did not use the term type or its equivalent as required by the ICN Art. 7.10. Therefore, Webster (1967) was the first type species designator and the type of this genus name is *G. lucida*.

The type of *Gymnanthes* has important taxonomic consequences for *Dendrocousinsia*. If *G. elliptica* were to be type species of *Gymnanthes*, then all of the species of *Dendrocousinsia* needed to be transferred to *Gymnanthes*. Then *Gymnanthes* should be considered as endemic to Jamaica. Since *G. lucida* and *G. elliptica* are not sister species and since *Gymnanthes* sensu lato is polyphyletic, these taxonomic rearrangements would require additional name changes involving several other species of this genus. Webster’s designation of *G. lucida* has solved the problem.

The core of Swartz’ herbarium is housed in S, wherein his collection for *Gymnanthes elliptica* has three specimens (S11-341, S-R-2667, S-R-2668). Among these, only S11-341 carries a single label showing the name *G. elliptica*. This specimen is selected here as the lectotype as it matches the description, and there is no evidence that the specimen was collected after 1788. Furthermore, annotations or labels of specimens collected during 18–19th centuries quite often do not show dates. We also located relevant specimens at G-DC and BR. The label of the BR specimen, however, shows Swartz as the collector with an expression of doubt (“Legit Swartz?”). Although another specimen from Swartz’s collection of this species is housed at BM, it is on long term loan to another institution, and we were unable to study this material. In contrast, the specimen housed at G-DC has a label indicating that it was part of Swartz’ herbarium.

*Excoecaria tinifolia* Sw. (Swartz, 1800) is a superfluous illegitimate name because it includes *G. elliptica* as a synonym, and thus both names are homotypic and the name *E. tinifolia* is typified by the type of *G. elliptica*. Had Swartz (1800) made the new combination *E. elliptica*, he would have published a legitimate name.

“*Gymnanthes obtusa* Baill.” is an invalid name as it was published by Baillon (1858) without a description; however, specimens of *Dendrocousinsia elliptica* housed in P (P95484446, P95484447, P95484448, P95484449) that were donated by Hooker, have labels that refer to “*G. obtusa*” and match the information found in the single line that Baillon (1858) devoted to this name: “(coll. Hooker. – h. Mus.).” Baillon worked in P where his collections are also housed.



2. *Odontocline dolichantha* (Krug & Urb.) B. Nord., Opera Bot. 44: 25. 1978. = *Senecio fadyenii* var. *dolichanthus* Krug & Urb. in I. Urban, Symb. Ant. 1: 470. 1899. = *Senecio dolichanthus* (Krug & Urb.) S. Moore, J. Bot. 67: 130. 1929.

Type: “Hab. in Jamaica in Blue Mountains, prope Vinegar Hill 1400 m (4200 ft.) alt. Apr., Jun. flor.: W. Harris in Bot. Dep. Herb. N. 5113, 6352”

Lectotype (designated here): *W. Harris 6352* (UCWI).

The protologue of *Senecio fadyenii* var. *dolichanthus* referred to a single locality and to two collections made by William H. Harris (5113 and 6352), which constitute syntypes. We located *W. Harris 5113* in BM (BM001024018), and its label indicates that it was collected from Woodcutter’s Gap. In contrast, *W. Harris 6352* (housed at UCWI) was collected from Vinegar Hill and matches the only locality mentioned in the protologue. Most of Urban’s herbarium (including types) at B were destroyed during the Second World War (Hiepko, 1996), and B does not house either *W. Harris 5113* or *W. Harris 6352*. It is worth mentioning that the protologue makes reference to William Harris’s collections housed at UCWI (as “W. Harris in Bot. Dep. Herb.”). The BM specimen (*W. Harris 5113*) was examined by Nordenstam in 1976, and it was annotated as a “Type Specimen.” However, Nordenstam (1978), in his taxonomic treatment for *Odontocline*, neither typified the name *S. fadyenii* var. *dolichanthus* nor made any reference to this BM specimen. We decided to select the specimen at UCWI (*W. Harris 6352*) as the lectotype because of three reasons: (1) this Jamaican institution houses the core of William Harris’ collections, and his UCWI specimens are mentioned in the protologue, (2) the label of this specimen matches the only collecting site mentioned in the protologue, and (3) its leaves are intact and better preserved than those of *W. Harris 5113* housed at the BM.

3. *Odontocline fadyenii* (Griseb.) B. Nord., Opera Bot. 44: 25. 1978. = *Senecio fadyenii* Griseb., Fl. Br. W. Ind.: 382. 1861.

Described from: “Jamaica! Macf.”

Lectotype [first-step: designated by Nordenstam (1978): “Type: Jamaica, Macfadyen (K Iso?).” Lectotype [second-step: designated here]: *J. Macfadyen s.n.* (K000497648; Isolectotype: K000497647).

The protologue of *Senecio fadyenii* refers to a single collection: “Jamaica!, Macf.” The core of Grisebach’s herbarium is housed in GOET, which has a single specimen with a label showing: “Senecio Fadyenii Gr. Jamaica Macf.” The specimen consists of just one leaf and three flower fragments; this specimen, however, does not match all the characteristics provided in the protologue (e.g., “branches cylindrical; leaves lanceolate-oblong or oblong, corymbs few-branched ...”). Obviously, other specimens were used by Grisebach for his species description. According to Stafleu & Cowan (1976: 1007), many of the types of the taxa described by Grisebach in his *Flora of the British West Indian Islands* are at K. Indeed, K houses two specimens (K000497647 and K000497648) collected by Macfadyen in Jamaica, and one of them (K000497648) was already labeled as “isotype?” by Nordenstam in 1976. The two specimens

do not have lanceolate-oblong or oblong leaves but match other characters found in the protologue. Therefore, we believe that any one of these two specimens could be chosen as a lectotype. We selected K000497648 as it was the one that Nordenstam labeled as a potential type.

Regarding previous typifications of *Senecio fadyenii*, we provide the following details. Kruger and Urban (in Urban, 1899: 470), within the protologue of *S. fadyenii* var. *dolichanthus* Krug & Urb., mentioned “Typus *S. Fadyenii* Griseb.!” and provided contrasting characters between var. *fadyenii* and var. *dolichanthus*. However, for *S. fadyenii*, they did not provide any other detail for their type citation, such as the type locality, name of the collector or herbarium housing the type, collection date and/or number. It appears that Kruger and Urban (in Urban, 1899: 470) merely wanted to emphasize that they have seen the type of *S. fadyenii* and that it is different from the syntypes of var. *dolichanthus* (*William H. Harris 5113 & 6352*).

For the name *Senecio fadyenii*, Nordenstam (1978) stated “Type: Jamaica, Macfadyen (K Iso?).” From this short text, it seems that Nordenstam assumed that GOET has the holotype and the duplicates elsewhere (including at K) are isotypes. Alternatively, his citation of the query sign “?” may be construed as that Nordenstam doubted whether K has an isotype or the holotype. As discussed above, the specimen housed in GOET is not to be treated as the holotype. Since a holotype is not mentioned within the protologue, Nordenstam’s (1978) usage of the term “iso?” for the K specimen can be corrected to lectotype (ICN Art. 9.9). Although Nordenstam narrowed his inadvertent lectotypification to a single herbarium (K), it is noted here that K has two specimens, and in his publication, Nordenstam did not mention which of these two specimens is the type. Therefore, we construe his inadvertent lectotypification as Lectotype [first-step], and our designation (K000497648) here constitutes: Lectotype [second-step].

4. *Odontocline hollickii* (Britton ex Greenm.) B. Nord., Opera Bot. 44: 25. 1978. = *Senecio hollickii* Britton ex Greenm., Ann. Missouri Bot. Gard. 3: 201. 1916.

Type: “Jamaica: rocky hillside, Union Hill, near Moneague, Parish of St. Ann’s, alt. 450 m., 6–7 April, 1908, Britton & Hollick 2729 (N.Y. Bot. Gard. Herb., photograph and fragment in Mo. Bot. Gard. Herb.) type.”

Lectotype (designated here): “Union Hill, near Moneague (Parish of St. Ann’s),” *N.L. Britton and A. Hollick 2729* (NY00126716; Isolectotype: MO714664).

Although the protologue of *Senecio hollickii* mentions that Britton & Hollick 2729 is the type collection, no holotype was cited or indicated. Greenman’s (1916) statement [“(N.Y. Bot. Gard. Herb., photograph and fragment in Mo. Bot. Gard. Herb.) type.”] is construed as citation of syntypes housed at NY and MO (see ICN Art. 8.3 Ex. 5), and a lectotype designation is needed for the name *S. hollickii*. Therefore, we herewith designate the single specimen housed in NY as the lectotype and the fragment at MO as the isolectotype. The NY specimen matches the species description and already bears an annotation showing it as a type material.

5. **Tetrasiphon** Urb., Symb. Antill. 5: 83. 1904. Type: *Tetrasiphon jamaicensis* Urb., Symb. Antill. 5: 84. 1904.

**Tetrasiphon jamaicensis** Urb., Symb. Antill. 5: 84. 1904.

Described from: "Hab. in Jamaica ad Militia Target-Range, m. Jul. (1896) fruct.: W. Thompson n. 6501, ad Road to Wareka 66 m. alt. solo calcareo, m. Jan. fl. et fr.: W. Harris n. 8604."

Lectotype (designated here): *W.H. Harris 8604* (UCWI02145; Isolectotypes: B 18 0003883, BM000838656, BM000838657, CAS0004792, NY00083835, NY00083836, UCWI02146, US01067800).

Urban described *Tetrasiphon* as a monotypic genus, and the protologue of its single species *T. jamaicensis* mentioned two collections (*W. Harris 8604* and *W. Thompson 6501*) from different localities, and the two collections represent syntypes. The collection of *W. Harris 8604* has been located in six herbaria (see above). Because Urban's herbarium was housed in B and since B has a single specimen of *W. Harris 8604* (B 18 0003883), one might prefer the B specimen for lectotypification because it was most likely part of Urban's study material for his species description. This specimen, however, is composed of several scattered fragments that do not readily match with the protologue description.

Therefore, it is evident that Urban's species description was based on additional material(s), which either once existed at B but were lost in the Second World War or the additional material(s) he studied are located elsewhere, and either way, the name needs a lectotypification. Since we consider the B specimen (*W. Harris 8604*) as not an ideal candidate for typification, we alternatively looked for a suitable specimen elsewhere. Besides housing two specimens of *W. Harris 8604*, the NY has a specimen (NY01385852) with the label showing the collection number as 6501, the locality as Militia Target-Range, and the date as July 13 1896, but lacking the collector's name. Nevertheless, we believe it is *W. Thompson 6501*. Since nine specimens of *W. Harris 8604* have been found with complete type collection data, we exclude *W. Thompson 6501* from our consideration for lectotypification. Of the nine specimens, we exclude the B specimen because of its fragmentary status (see above). Although anyone of the remaining eight specimens is eligible for a lectotypification, we choose *W. Harris 8604* (UCWI-02145) as the lectotype. This specimen matches well with the protologue description. It is emphasized here that for a lectotypification, any duplicate of the original material cited in the protologue, whether seen or unseen by Urban, is eligible (vide Art. 9.3 (b), (c)).

#### LITERATURE CITED

- ACEVEDO-RODRÍGUEZ, P. AND M. T. STRONG [EDS]. 2012. Catalogue of seed plants of the West Indies. Smithsonian Contr. Bot. 98: 1–1192.
- ADAMS, C. D. 1972. Flowering plants of Jamaica. University of the West Indies, Mona, Jamaica.
- BAILLON, H. E. 1858. Étude générale du groupe des Euphorbiacées. Victor Masson, Paris.
- BRETTE, P. 1983a. Jamaica's flowering plants: the five endemic genera. *Jamaica J.* 16(1): 20–23.
- . 1983b. Jamaica's flowering plants: endemic genera revisited. *Jamaica J.* 16(2): 49.
- BRITTON, N. L. AND J. A. SHAFER. 1908. North American trees. Henry Holt and Company, New York.
- ESSER, H.-J. 2001. Tribes Hippomaneae, Pachystromateae, Hureae. Pages 352–398 in A. RADCLIFFE-SMITH. *Genera Euphorbiacearum*. Royal Botanic Gardens, Kew, UK.
- FRANCISCO-ORTEGA, J., E. SANTIAGO-VALENTÍN, P. ACEVEDO-RODRÍGUEZ, C. LEWIS, J. PIPOLY III, A. W. MEEROW AND M. MAUNDER, M. 2007. Seed plant genera endemic to the Caribbean Island biodiversity hotspot: a review and a molecular phylogenetic perspective. *Bot. Rev.* 73: 183–234.
- , I. VENTOSA, R. OVIEDO, F. JIMÉNEZ, F. P. HERRERA, M. MAUNDER, AND J. L. PANERO 2008. Caribbean Island Asteraceae: systematics, molecules, and conservation on a biodiversity hotspot. *Bot. Rev.* 74: 112–131.
- GREENMAN, J. M. 1916. A new *Senecio* from Jamaica. *Ann. Missouri Bot. Gard.* 3: 201–202.
- HERRERA OLIVER, P. P. AND P. A. GONZÁLEZ GUTIÉRREZ. 2013. *Acanthodesmos gibarensis* (Asteraceae, Vernoniae), a new species from Cuba. *Willdenowia* 43: 315–318.
- HIEPKO, P. 1996. Collections in the Botanical Museum Berlin-Dahlem (B) of particular interest for the Flora of the Greater Antilles. *Fl. Greater Antilles Newslett.* 10.
- MCNEILL, J., F. R. BARRIE, W. R. BUCK, V. DEMOULIN, W. GREUTER, D. L. HAWKSWORTH, P. S. HERENDEEN, S. KNAPP, K. MARHOLD, J. PRADO, W. F. PRUDHOMME VAN REINE, G. F. SMITH, J. H. WIERSEMA, AND N. J. TURLAND. 2012. *International code of nomenclature for algae, fungi, and plants (Melbourne Code)*. Regnum Veg. vol. 154. Koeltz Scientific Books, Koenigstein.
- , F. R. BARRIE, K. N. GANDHI, V. C. HOLLOWELL, S. A. REDHEAD, L. SÖDERSTRÖM, AND J. L. ZARUCCHI. 2016. Proposals to amend the provisions of the Code on selection of types of generic names using a largely mechanical method. *Taxon* 65: 1441–1442.
- NORDENSTAM, B. 1978. Taxonomic studies in the tribe Senecioneae (Compositae). *Opera Bot.* 44: 1–84.
- PROCTOR, G. R. 1982. More additions to the flora of Jamaica. *J. Arnold Arbor.* 63: 199–315.
- STAFLEU, F. A. AND R. S. COWAN. 1976. Taxonomic literature. Volume I: A–G. Second edition. Bohn, Scheltema & Holkema, Utrecht.
- SWARTZ, O. 1788. *Nova genera & species plantarum seu prodromus*. Stockholm.
- . 1800. *Flora Indiae Occidentalis* volume 2(2). Erlangen.
- TURLAND, N. AND J. H. WIERSEMA. 2017. Synopsis of Proposals on Nomenclature—Shenzhen 2017: A review of the proposals concerning the *International Code of Nomenclature for algae, fungi, and plants* submitted to the XIX International Botanical Congress. *Taxon* 66: 217–274.
- URBAN, I. 1899. *Symbolae antillanae* volume 1(3). Fratres Borntraeger, Berlin.
- WEBSTER, G. L. 1967. The genera of Euphorbiaceae in the Southeastern United States. *J. Arnold Arbor.* 48: 303–430.
- . 1994. Synopsis of the genera and suprageneric taxa of Euphorbiaceae. *Ann. Missouri Bot. Gard.* 81: 33–144.

# NOMENCLATURAL ADJUSTMENTS IN NORTH AMERICAN *ARABIS*, CHINESE *HILLIELLA*, AND SOUTH AMERICAN *NEUONTOBOTRYS* (BRASSICACEAE)

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**Abstract.** The new combinations *Arabis adpressipilis*, *Hilliella rupicola* subsp. *shuangpaiensis*, *H. sinuata* subsp. *qianwuensis*, and *Neuontobotrys amplexicaulis* are proposed. The distinguishing characters of *A. adpressipilis* from *A. pycnocarpa* are discussed and evaluated. The new combinations in *Hilliella* were previously recognized in *Yinshania* when the genera were united but now recognized in different tribes. The basionym of the long-neglected *Hesperis amplexicaulis* predates that of *Sisymbrium grayanum*, and therefore becomes the basis for the new combination in *Neuontobotrys*. *Sisymbrium amplexicaule* and *S. amplexicaule* var. *tenuicaule* are lectotypified.

**Keywords:** *Arabis*, Brassicaceae, Cruciferae, Neuontobotrys, new combinations

Ongoing research on the family Brassicaceae (Cruciferae) for the worldwide Brassicaceae database or BrassiBase (<https://brassicbase.cos.uni-heidelberg.de/>) and the World Flora Online (<http://www.worldfloraonline.org/>) showed that the nomenclature of a North American

species of *Arabis* L., two Chinese subspecies of *Hilliella* (O.E.Schulz) Y.H.Zhang, and a South American *Neuontobotrys* O.E.Schulz needed updating to bring them in line with accounts of other genera of the family, and they are dealt with herein.

## ARABIS

North American *Arabis* was so broadly delimited by various authors (e.g., Hopkins, 1937; Rollins, 1941, 1993; Mulligan, 1996) that it included species currently assigned to eight genera in six different tribes. These include *Arabidopsis* Heynh. (tribe Camelinae), *Arabis* (Arabideae), *Pennellia* Nieuwl. (Halimolobeae), *Streptanthus* Nutt. (Thelypodieae), *Turritis* L. (Turritideae), and *Boechera* Á.Löve & D.Löve, *Borodinia* N.Busch, and *Yosemitea* P.J.Alexander & Windham (Boechereae). For updated literature on the transfer of species from *Arabis* to the above genera and tribes, the reader is advised to consult Al-Shehbaz (2010), Alexander et al. (2013), and references therein.

The species dealt with here is *Arabis pycnocarpa* M.Hopkins and its var. *adpressipilis* M.Hopkins, both of which taxa were described by Hopkins (1937). Four years after their description, Rollins (1941) treated them as varieties of *A. hirsuta*, a position he held for the following five decades (Rollins, 1993). By contrast, Mulligan (1996) reduced *A. pycnocarpa* to a variety of *A. hirsuta* and placed var. *adpressipilis* in its synonymy. As shown by Karl et al. (2010), and later confirmed by Karl and Koch (2013, 2014), *A. hirsuta* is strictly an Eurasian species. The differences between these two species in morphology, chromosome numbers, and molecular data strongly support the distinctness of *A. hirsuta* from *A. pycnocarpa*. As a result, Al-Shehbaz (2010) followed Hopkins (1937) in excluding *A. hirsuta* from the Flora of North America and in maintaining both *A. pycnocarpa* and var. *adpressipilis*, though he suggested that they should perhaps be recognized

at least at the subspecific rank.

The question that has not yet been fully resolved is whether or not to maintain the plants of “*adpressipilis*” as a variety of *Arabis pycnocarpa*, to recognize it as a subspecies instead of variety, or to treat it as a distinct species. As discussed below, the evidence at hand supports the recognition of var. *adpressipilis* as a distinct species, and a detailed description of it is provided for the first time.

***Arabis adpressipilis*** (M. Hopkins) Al-Shehbaz, *comb. et stat. nov.*

Basionym: *Arabis pycnocarpa* var. *adpressipilis* M.Hopkins, *Rhodora* 39: 117. 1937. TYPE: UNITED STATES. Missouri: Shannon Co., Montier, 13 May 1894, *Benjamin F. Bush* 32 (Holotype: GH-00018780; Isotypes: MO-142240 [as MO-2112399 in JSTOR], NDG-04352, NY-0172645).

*Herbs*, biennial. *Stems* 2.5–7.5 dm, erect, usually single at base, simple or sometimes few branched above, often exclusively pubescent proximally with appressed, malpighiaceae or minutely stalked submalpighiaceae trichomes, rarely glabrescent. *Basal leaves* rosulate; petiole obsolete or 0.5–1.5 cm, not ciliate; leaf blade oblanceolate to oblong, 1–5 cm × 3–8 mm, pubescent with sessile, forked and/or stellate trichomes, margin entire or repand, apex obtuse or acute; cauline leaves 15–46, overlapping or not, sessile, oblong to lanceolate or linear, middle ones 1–5.5 cm × 2–8 mm, usually sparsely pubescent on both surfaces or adaxially glabrescent, base auriculate, margin entire, apex acute or obtuse. *Racemes* often simple; fruiting pedicels

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erect to erect-ascending, appressed to rachis, 3–7 mm, slender, usually glabrous. *Sepals* oblong, 2.5–3.5 mm, base of lateral pair not saccate; petals white, linear-oblongate, 3–4.5 × 1–2 mm, apex obtuse; filaments slender, 2.5–3.5 mm; anthers oblong, 0.7–1 mm; ovules 60–72 per ovary. *Fruit* linear, (4–)4.5–6(–6.5) cm × 0.8–1(–1.2) mm, erect to erect-ascending, often appressed to rachis, flattened; valves glabrous, torulose, often with obscure midvein; style slender, 0.5–1.3 mm. *Seeds* brown, ovate, 1–1.4 × 0.8–1 mm, uniseriate, narrowly winged all around, wing to 0.2 mm wide distally.

**Phenology:** flowers March–June.

**Habitat:** the species grows in dolomite glades, rich woods, ravines, and pastures, as well as on cliffs, calcareous talus, bluffs, and rocky ledges at elevations to 300 m.

**Distribution:** Canada (Ontario) and the United States (Illinois, Indiana, Iowa, Kansas, Missouri, New York, Ohio, Pennsylvania, Tennessee, and Virginia).

**Distinguishing characters:** *Arabis adpressipilis* is closely related to *A. pycnocarpa* under which (Hopkins, 1937; Al-Shehbaz, 2010) or under *A. hirsuta* (Rollins, 1941, 1993; Mulligan, 1996) it was recognized for the past 80 years as a variety or a synonym. These authors placed more emphasis on the overall morphology of the plant and placed less value on trichome morphology. The lower stems of *A. adpressipilis* are almost always exclusively pubescent proximally with appressed, malpighiaceae or minutely stalked submalpighiaceae trichomes and are rarely glabrescent, and the basal leaves are pubescent with sessile, forked and/or stellate trichomes and their margins are always

not ciliate. By contrast, the lower stems of *A. pycnocarpa* are hirsute with simple trichomes, and the basal leaves are pubescent with simple and distinctly stalked forked trichomes and their margins are ciliate. Both species are consistently and readily distinguishable, and of the hundreds of specimens I examined over the past three decades from throughout their ranges, I have seen only three plants that have the lower stems with a mixture of forked and simple trichomes, instead of exclusively simple (*A. pycnocarpa*) or exclusively malpighiaceae or submalpighiaceae (*A. adpressipilis*). These plants are *Herman 8790* (GH) from Jo Davies Co. (Illinois), *Friesner 19072* (GH) from Elkhart Co. (Indiana), and *Cody et al. 9454* (DAO) from West Bay of Manitoulin Island, Ontario (Canada). It is not known if they represent intermediates of hybrid origin, but without full-scale experimental crossing and molecular studies, I prefer not to place extra weight on them at least for now. Although both species are distributed in parts of the states of Iowa, Kansas, New York, Ohio, Pennsylvania, and Virginia, as well as in Ontario Province, it does not seem, at least for now, that they grow sympatrically. It would be a good idea for local botanists in those regions to survey the distribution of both species. Furthermore, about a dozen chromosome counts were published for *A. pycnocarpa* (see Warwick & Al-Shehbaz, 2006), and all except for an erroneous count consistently show that the species is tetraploid with  $2n=32$ . However, no counts have been made thus far for *A. adpressipilis*, and cytological studies on this species may shed some light on possible lack of gene flow between it and *A. pycnocarpa*.

#### HILLIELLA

*Hilliella* was originally proposed by Schulz (1923) as a section of *Cochlearia* L. and later raised by Zhang and Li in Zhang (1986) to the rank of genus. Seven additional species were later described by Zhang (1987, 1995, 1997), and she (Zhang, 2003) revised the genus together with *Yinshania* Ma & Y.Z.Zhao. *Hilliella* was subsequently united by Al-Shehbaz et al. (1998) with the earlier-published *Yinshania* Ma & Y.Z.Zhao, and the combined genus was maintained by Zhou et al. (2001) and placed in the monogeneric tribe Yinshanieae by Warwick et al. (2010). However, recent molecular phylogenetic studies by Chen et al. (2016) have shown that *Hilliella* should be maintained as distinct genus assigned to the Hilliellaeae, a tribe remotely related to the Yinshanieae. All names in *Hilliella* at the species rank are available and pose no problem. However, two subspecies, which were recognized by Al-Shehbaz et al. (1998) in *Yinshania*, remained in this genus while their species are currently placed in *Hilliella*. Therefore, the following two new combinations are proposed.

***Hilliella sinuata* subsp. *qianwuensis*** (Y.H.Zhang) Al-Shehbaz & D.A.German, *comb. nov.*

Basionym: *Hilliella sinuata* var. *qianwuensis* Y.H.Zhang, Acta Bot. Yunnan. 8: 405. 1986. TYPE: CHINA. Jiangxi, Qianwu, 700 m, 8 May 1958, Q. M. Hu & Q. H. Li 1761 (Holotype: LBG (as HLG); Isotype: PE).

Homotypic synonym: *Yinshania sinuata* subsp. *qianwuensis* (Y.H.Zhang) Al-Shehbaz, G.Yang, L.L.Lu & T.Y.Cheo, Harvard Pap. Bot. 3: 89. 1998.

***Hilliella rupicola* subsp. *shuangpaiensis*** (Z.Y.Li) Al-Shehbaz & D.A.German, *comb. nov.*

Basionym: *Hilliella shuangpaiensis* Z.Y.Li, Acta Bot. Yunnan. 10: 117. 1988. TYPE: CHINA. Hunan, Shuangpai, Ma Jiang, Tong-zhi Shan, 1000 m, 22 Sep 1986, C. L. Liao 1439 (Holotype: HUTM, as HNMI).

Homotypic synonym: *Yinshania rupicola* subsp. *shuangpaiensis* (Z.Y.Li) Al-Shehbaz, G.Yang, L.L.Lu & T.Y.Cheo, Harvard Pap. Bot. 3: 92. 1998.

Heterotypic synonym: *Hilliella xiangguiensis*, Y.H.Zhang, Acta Bot. Yunnan. 19: 139. 1997. TYPE: CHINA. Hunan, Suining, Huangshuangxiang, Chibancun, Laolongta, 1700 m, 17 Jul 1985, C. Z. Yuan 319 (Holotype: HUTM).



## NEUONTOBOTRYS

*Neuontobotrys* is a genus of 14 South American species distributed from southern Peru and Bolivia south into Argentinean and Chilean Patagonia (Al-Shehbaz, 2004, 2006; Al-Shehbaz et al., 2013). The majority of species in the genus were previously placed in *Sisymbrium* L. and *Eremodraba* O.E.Schulz, and the nomenclature of all except one is straightforward. The basionym of one of the Peruvian species was incorrectly accepted by Al-Shehbaz (2006), and the new combination below addresses that unfortunate mistake.

**Neuontobotrys amplexicaulis** (Kuntze) Al-Shehbaz, *comb. nov.*

Basionym: *Hesperis amplexicaulis* Kuntze, Revis. Gen. Pl. 2: 934. 1891. TYPE: PERU. Andes, between Caball [Caballos] and Obrajillo, *Capt. Wilkes Expedition 1838-1842* (Lectotype designated here: GH-00312582; Isolectotypes: K-000485117, P-02272632, US-00099947).

Homotypic synonyms: *Sisymbrium amplexicaule* A.Gray, U.S. Expl. Exped., Phan. Pacific N. Amer., 15(1): 61. 1854, non *S. amplexicaule* Desf., Fl. Atlant. 2: 81. 1798, nec *S. amplexicaule* Phil., Fl. Atacam. 8: 10. 1860; *Sisymbrium grayanum* Baehni & J.F.Macbr., Candollea 7: 295. 1937; *Neuontobotrys grayanus* (Baehni & J.F.Macbr.) Al-Shehbaz, Darwiniana 44: 351. 2006.

Heterotypic synonyms: *Sisymbrium amplexicaule* A.Gray var. *tenuicaule* O.E.Schulz in Engler, Pflanzenreich

IV. 105(Heft 86): 58. 1924; *S. grayanum* Baehni & J.F.Macbr. var. *tenuicaule* (O.E.Schulz) Baehni & J.F.Macbr., Candollea 7: 296. 1937. TYPE: PERU. Western slopes of the Andes, between 13° and 14°S, above Pisco, between Huauyanga and Pampano, May 1910, 1000-1200 m, A. Weberbauer 5378 (Lectotype designated here: B; Isolectotypes: F-0092989, G-00371894, GH-00312581).

Baehni & Macbride (1937) proposed the new name *Sisymbrium grayanum* to replace the illegitimate later homonym *S. amplexicaule* A.Gray, and they listed *Hesperis amplexicaulis* Kuntze as a synonym. However, in recognizing the species in *Neuontobotrys*, Al-Shehbaz (2006) should have taken Kuntze's (1891) epithet, which predates that of Baehni & Macbride by 46 year, and recognized it as a new name following Article 58 of the International Code of Nomenclature for Algae, Fungi, and Plants (McNeill et al., 2012).

Neither Baehni and Macbride (1937) nor Macbride (1938) typified *Sisymbrium amplexicaule* A.Gray or *S. amplexicaule* var. *tenuicaule*. Both names needed lectotypification because Asa Gray annotated the duplicates of the former name at GH and US, and Schulz annotated those at B and F of the latter name. The mere listing by Al-Shehbaz (2006) of GH and B as the holotypes of *S. amplexicaule* and var. *tenuicaule*, respectively, does not constitute valid lectotypifications of both names because the phrase "designated here" or its equivalent was not indicated (see Article 9, note 6 in McNeill et al., 2012; McNeill 2014).

## LITERATURE CITED

- ALEXANDER, P. J., M. D. WINDHAM, J. B. BECK, I. A. AL-SHEHBAB, L. ALLPHIN, AND C. D. BAILEY. 2013. Molecular phylogenetics and taxonomy of the genus *Boechera* and related genera (Brassicaceae, Boechereae). *Syst. Bot.* 38: 192–209.
- AL-SHEHBAB, I. A. 2004. A synopsis of the South American *Neuontobotrys* (Brassicaceae). *Novon* 14: 253–257.
- . 2006. The genus *Sisymbrium* in South America, with synopses of the genera *Chilocardamum*, *Mostacillastrum*, *Neuontobotrys*, and *Polypsecadium* (Brassicaceae). *Darwiniana* 44: 341–358.
- . 2010. *Arabis*. Pages 257–266 in FLORA OF NORTH AMERICA EDITORIAL COMMITTEE, EDS. *Flora of North America*. Vol. 7. Oxford University Press, New York.
- , G. YANG, L. L. LU, AND T. Y. CHEO. 1998. Delimitation of the Chinese genera *Yinshania*, *Hilliella*, and *Cochleariella* (Brassicaceae). *Harvard Pap. Bot.* 3: 79–94.
- , A. CANO, H. TRINIDAD, AND E. NAVARRO. 2013. New species of *Brayopsis*, *Descurainia*, *Draba*, *Neuontobotrys*, and *Weberbaueria* (Brassicaceae) from Peru. *Kew Bulletin* 68: 219–231.
- BAEHNI, C. AND J. F. MACBRIDE. 1937. Remarques sur les Cruciferae-Sisymbrieae. *Candollea* 7: 291–296.
- CHEN, H., T. DENG, J. P. YUE, I. A. AL-SHEHBAB, AND H. SUN. 2016. Molecular phylogeny reveals the non-monophyly of tribe Yinshanieae (Brassicaceae) and description of a new tribe, Hilliellae, *Plant Diversity* 38: 171–182.
- HOPKINS, M. 1937. *Arabis* in eastern and central North America. *Rhodora* 39: 63–98, 106–148, 155–189. Also reprinted in *Contrib. Gray Herb.* vol. 116 (same pagination as in *Rhodora*). 1937.
- KARL, R. AND M. KOCH. 2013. A world-wide perspective on crucifer speciation and evolution: phylogenetics, biogeography and trait evolution in tribe Arabideae. *Annals Bot.* 112: 983–1001.
- AND ———. 2014. Phylogenetic signatures of adaptation: The *Arabis hirsuta* species aggregate (Brassicaceae) revisited. *Perspectives Pl. Ecol. Evol. Syst.* 16: 247–264.
- KOCH, M. A., R. KARL, C. KIEFER, AND I. A. AL-SHEHBAB. 2010. Colonizing the American Continent: Systematics of the genus *Arabis* in North America (Brassicaceae). *Amer. J. Bot.* 97: 1040–1057.
- KUNTZE, O. 1891. *Revisio Genera Plantarum*. Vol. 2. Arther Felix, Leipzig.
- MACBRIDE, J. F. 1938. Cruciferae. Pages 937–983 in J. F. MACBRIDE, ED. *Flora of Peru*. Field Mus. Nat. Hist., Bot. Ser. 13.
- MCNEILL, J. 2014. Holotype specimens and type citations: general issues. *Taxon* 63: 1112–1113.
- MCNEILL, J., F. R. BARRIE, W. R. BUCK, V. DEMOULIN, W. GREUTER, D. L. HAWSWORTH, P. S. HERENDEN, S. KNAPP, K. MARHOLD, J. PRADO, W. F. PRUD'HOMME VAR REINE, G. F. SMITH, J. H. WIERSEMA, AND N. J. TURLAND, EDS. 2012. *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code): Adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011*. *Regnum Vegetabile* 154. Koeltz Scientific Books.

- MULLIGAN, G. A. 1996. Synopsis of the genus *Arabis* (Brassicaceae) in Canada, Alaska and Greenland. *Rhodora* 97: 109–163.
- ROLLINS, R. C. 1941. A monographic study of *Arabis* in western North America. *Rhodora* 43: 289–325, 348–411, 425–481. Also reprinted in *Contrib. Gray Herb.* vol. 138 (same pagination as in *Rhodora*). 1941.
- . 1993. *The Cruciferae of continental North America*. Stanford University Press, Stanford.
- SCHULZ, O. E. 1923. Eine neue Sektion der Gattung *Cochlearia* L. *Notizbl. Bot. Gart. Berlin-Dahlem* 8: 544–546.
- WARWICK, S. I. AND I. A. AL-SHEHBAZ. 2006. Brassicaceae: chromosome number index and database on CD-Rom. *Pl. Syst. Evol.* 259: 237–248.
- ZHANG, Y. H. 1986. *Hilliella*, a new genus of Chinese Cruciferae. *Acta Bot. Yunnan.* 8: 397–406.
- . 1987. Five new species of the *Hilliella* (Cruciferae). *Acta Bot. Yunnan.* 9: 52–161.
- . 1995. A new species of *Hilliella* (Cruciferae) from Anhui. *Acta Phytotax. Sin.* 33: 94–96.
- . 1997. A new species of *Hilliella* from Hunan and Guangxi. *Acta Bot. Yunnan.* 19: 139–140.
- . 2003. Delimitation and revision of *Hilliella* and *Yinshania* (Brassicaceae). *Acta Phytotax. Sin.* 41: 305–349.
- ZHOU, T. Y., L. L. LU, G. YANG, AND I. A. AL-SHEHBAZ. 2001. Brassicaceae. Pages 1–193 in C. Y. WU AND P. H. RAVEN, EDS. *Flora of China*. Vol. 8. Academic Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

# CATASETUM ×DUNSTERVILLEI (ORCHIDACEAE: CATASETINAE), A NATURAL HYBRID CONFIRMED BY ARTIFICIAL HYBRIDIZATION

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**Abstract.** The parentage of *Catasetum ×dunstervillei*, a natural hybrid or nothospecies, formally proposed in 1989 from the vicinity of Puerto Ayacucho, Amazonas state, Venezuela, was confirmed *via* artificial hybridization. The originally proposed putative parents were *Catasetum pileatum* and *C. discolor*. In nature, both species are pollinated by the same male Euglossine bees, *Eulaema meriana* and *E. cingulata*, and the two orchids are found in close proximity and have overlapping flowering seasons: the hybrid is relatively common. The artificial hybrid took 44 months (January 2014–September 2017) from the time seeds were planted to the first flowering.

**Resumen.** El parentaje de *Catasetum ×dunstervillei*, un híbrido natural o notoespecies propuesto en 1989 de plantas procedentes de las cercanías de Pto. Ayacucho, Amazonas, Venezuela, se confirmó *via* hibridización artificial. Las especies parentales putativas originalmente propuestas fueron *Catasetum pileatum* y *C. discolor*. En la naturaleza, las dos especies son polinizadas por las mismas abejas euglosinas, *Eulaema meriana* y *E. cingulata* y son simpátricas; además, sus periodos de floración se solapan por lo que el híbrido natural es relativamente común. El híbrido artificial tomó 44 meses (enero 2014 hasta septiembre 2017) desde el momento en que se sembraron las semillas hasta la primera floración.

**Keywords:** *Catasetum ×dunstervillei*, natural and artificial hybridization, Euglossine bees, Orchidaceae

The monumental works published in six volumes by G. C. K. Dunsterville and L. A. Garay in their series *Venezuelan Orchids Illustrated* (1959–1976), and in five volumes by E. Foldats for the Flora of Venezuela (1969–1970), have long served as basic references for the orchid flora of northern South America.

These were the references available in the early 1980s when the senior author initiated a study of all *Catasetum* Rich. species and their male Euglossine bee pollinators in the vicinity of Puerto Ayacucho, the capital of Amazonas state, Venezuela. It was soon evident that there were many *Catasetum* species in the study area, often occupying the same habitat, that several were pollinated by the same male euglossine bees, and that they had overlapping flowering seasons: the chances for natural hybridization were high. Eventually, two of the authors (GAR-G. and GC) formally proposed a number of natural hybrids or nothospecies from this region (Romero and Carnevali, 1989, 1990, 1991a–b, 1992).

The first clue that helped decipher the hybrid treated here came from R. L. Dressler in a review of Dunsterville and Garay's *Venezuelan Orchids Illustrated*.

Dressler (1968) suggested that a drawing published as *Catasetum fimbriatum* (Morren) Lindl. (Dunsterville and Garay, 1966: 43; 1979: 85; Fig. 1; also partially shown in Foldats, 1970, IV: 82) was actually a hybrid between *Catasetum discolor* (Lindl.) Lindl. and *Catasetum pileatum* Rchb.f. (i.e., “*Catasetum discolor* Lindl. × *pileatum* Rchb.f.”; Dressler, 1968: 131).

It was evident that the plant drawn by Dunsterville was different from *Catasetum fimbriatum*, a species known from southern Brazil and northern Argentina (Fig. 2). The name actually had been suggested to Garay by C. Schweinfurth in 1963 (according to a note in Schweinfurth's handwriting on Garay's copy of the drawing at AMES). The plant that Dunsterville illustrated was collected in the upper Orinoco river in the early 1960s by Pablo Anduze Díaz (1902–1989), a renowned Venezuelan medical doctor, entomologist, and ethnologist, twice governor of Venezuela's Amazonas state (1960–1963 and 1974–1976), and member of the expedition that found the sources of the Orinoco in 1951. According to Dunsterville, the sepals were “pale green suffused with pink, particularly on the back,” the petals “pale green, suffused with pink at apex,” the labellum “...underside surface light green, upper surface light brown inside ‘cup,’ bordered on apical section of cup by pale cream with a soft-textured surface. Reminder (*sic*) of surface greeny-yellow with some wax-shiny pinkish suffusion on margin near base. Margin of cup tends to be yellow.” Both the column and anther were “white.” Dunsterville also pointed out that “it was very noticeable that the flowers appear in groups of three with a distinct gap along the rachis before the next group of three pedicels arise” (from Dunsterville's original notes at AMES; an edited description was published in Dunsterville and Garay, 1966: 42).

The senior author eventually collected both parents (Fig. 3–4) and the hybrid (Fig. 5) in the vicinity of Puerto Ayacucho, although *C. discolor* was extremely rare in the

The senior author thanks D. Fulop for providing material to prepare the plate shown in figure 2; Carlos Gómez,<sup>†</sup> who patiently and skillfully grew and brought to flower orchid plants collected in the vicinity of Puerto Ayacucho, Amazonas state, Venezuela; and the Orchid Society of Arizona for providing generous financial support.

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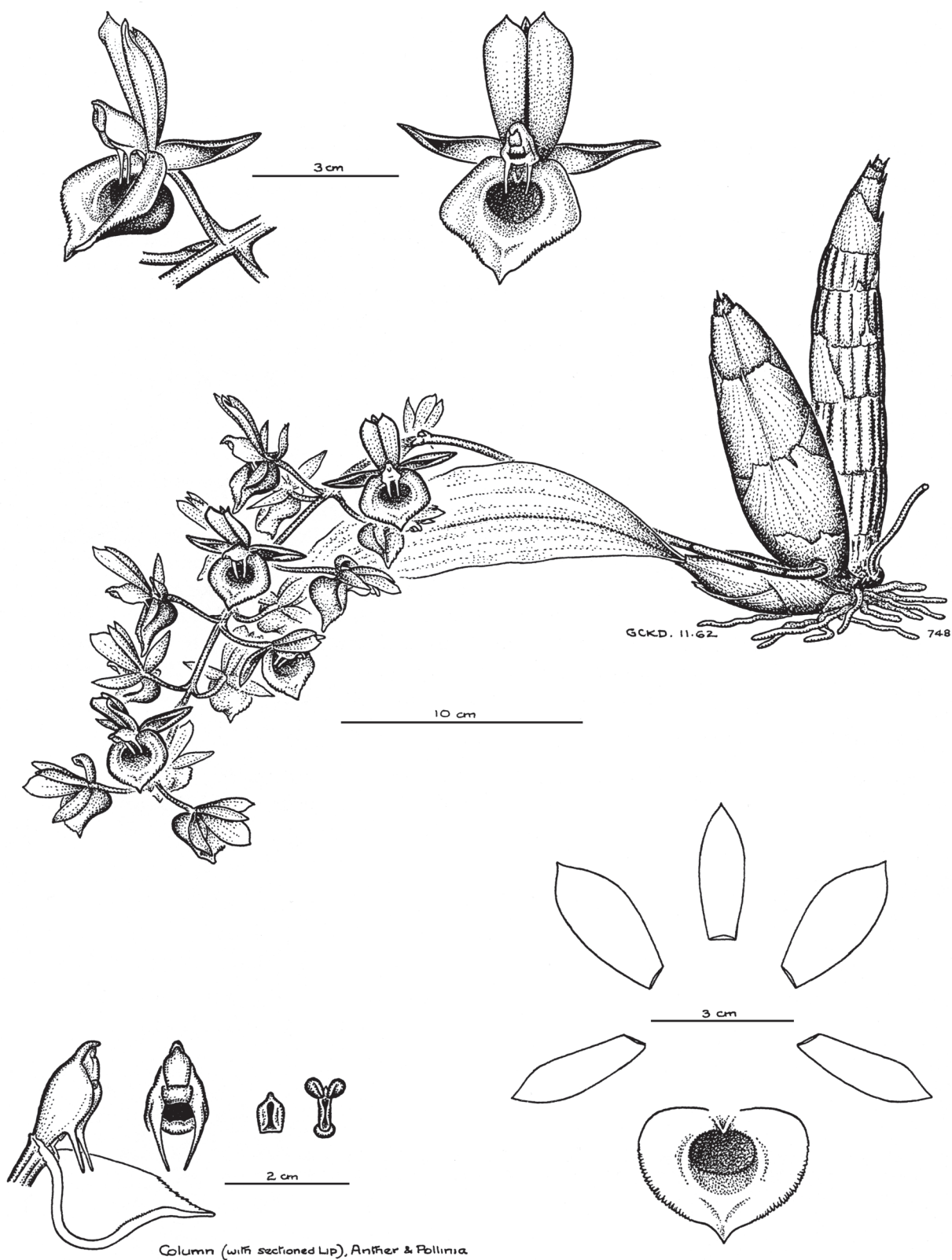


FIGURE 1. *Catasetum x dunstervillei* G.A.Romero & Carnevali originally published as *Catasetum fimbriatum* (Morren) Lindl. (1850). Drawing by G. C. K. Dunsterville based on *Dunsterville* 748 (apparently not preserved; photostat copy of original drawing at AMES).



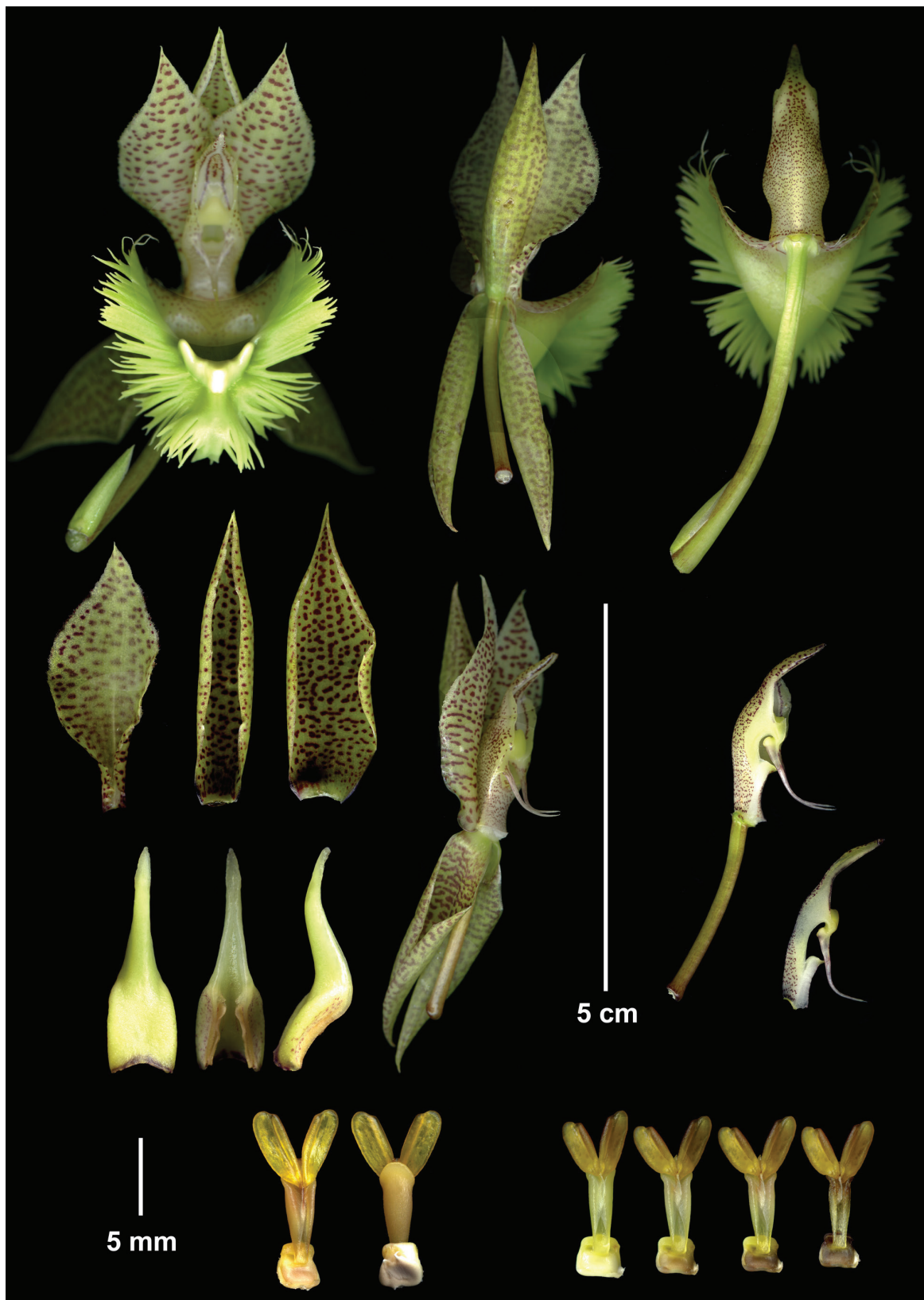


FIGURE 2. *Catasetum fimbriatum* (Morren) Lindl. Scan and composition by G. A. Romero-González based on a plant cultivated by D. Fulop at Harvard University (fragments at AMES sub Romero s.n.).

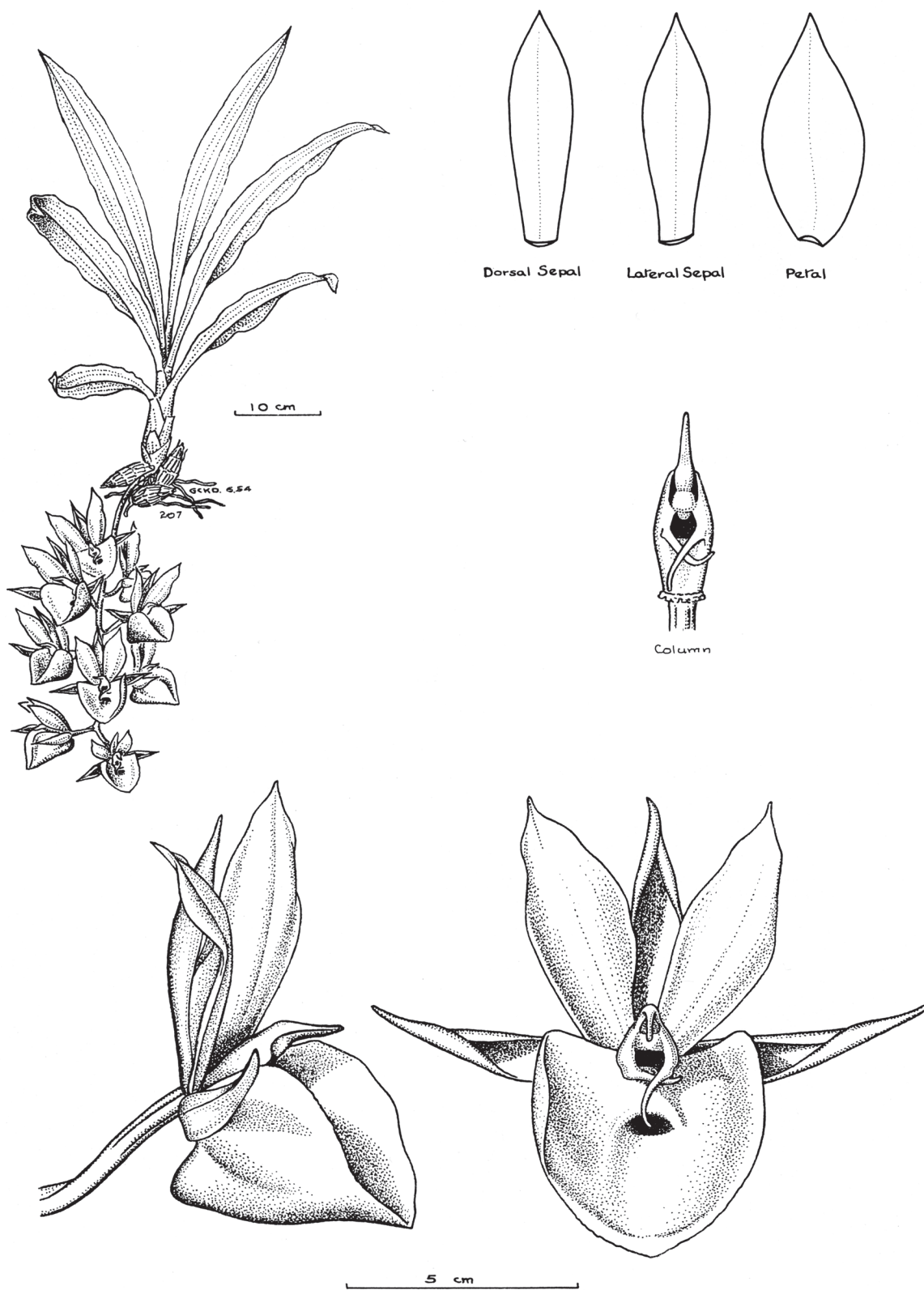


FIGURE 3. *Catasetum pileatum* Rchb.f. Drawing by G. C. K. Dunsterville based on *Dunsterville 207*, apparently not preserved, photostat copy of original drawing at AMES.

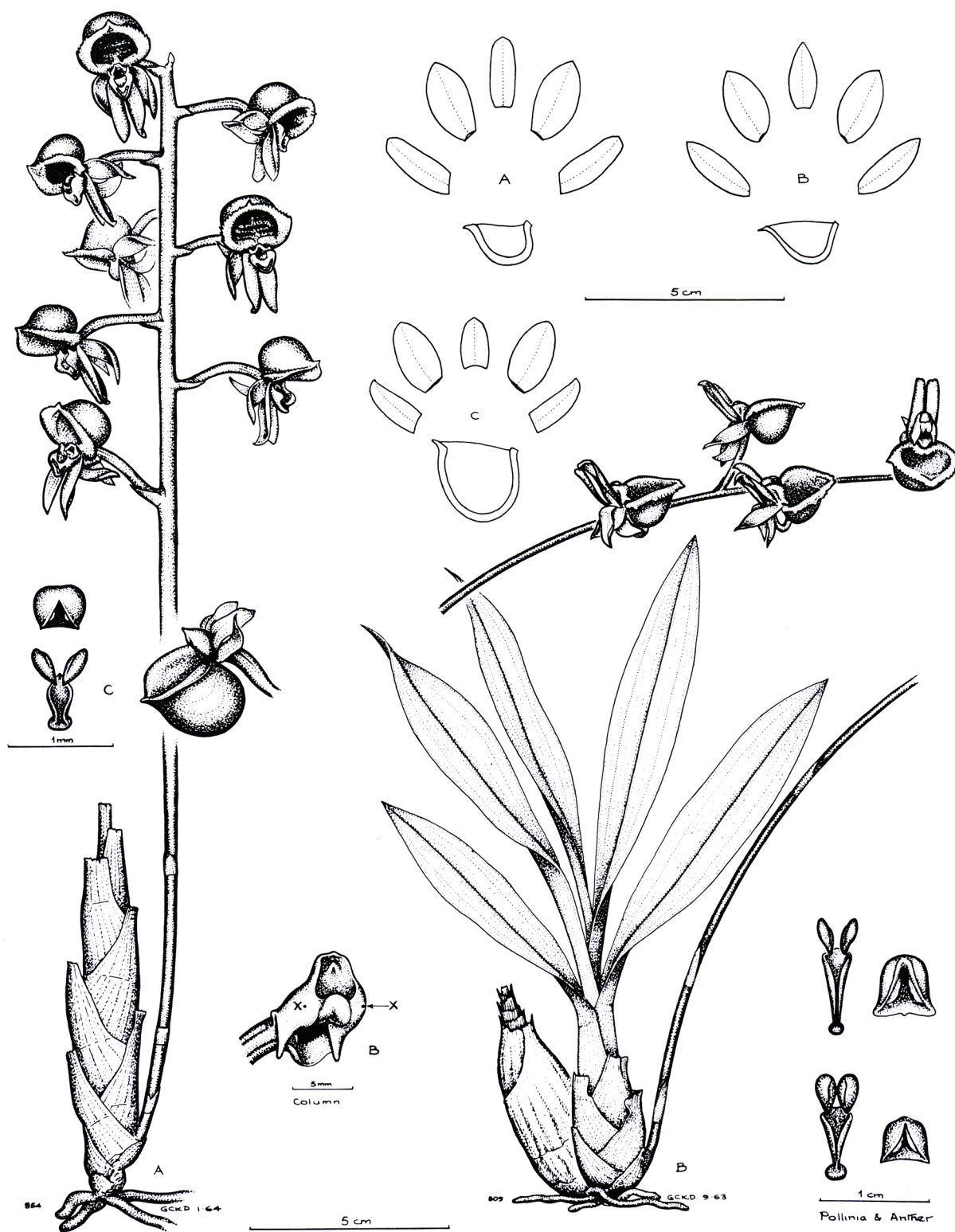


FIGURE 4. *Catasetum discolor* (Lindl.) Lindl. Drawing by G. C. K. Dunsterville based on *Dunsterville* 854, apparently not preserved, photostat copy of original drawing at AMES.



FIGURE 5. *Catasetum x dunstervillei* G.A.Romero & Carnevali. Photographed by G. A. Romero-González.



region, usually found growing in sandy soils. The natural hybrid was formally proposed by Romero and Carnevali (1989; see also 1991a). Plants of this nothospecies subsequently have been collected several times by orchid aficionados and have been in horticultural orchid collections for the past twenty years. They have also appeared from time to time in orchid shows in Venezuela and elsewhere.

The pollinators of *C. pileatum* are *Eulaema cingulata* (Fabricius), *E. meriana* (Olivier), and *E. nigrita* Lepelletier (Romero and Carnevali, 1990; Fig. 6A–B; *E. nigrita* is not shown in Fig. 6 but it does appear in Romero and Carnevali, 1990: 1219, lower figure); the pollinators of *C. discolor* are *Eulaema bombiformis* (Packard), *E. cingulata*, and *E. meriana* (Romero and Carnevali, 1991b; Fig. 6C–D).

These two *Catasetum* species, however, employ entirely different pollination mechanisms.

In *Catasetum pileatum*, bees approach the front of the resupinate male flower (Fig. 7A), flying rapidly toward and away from the flower, eventually touching the triggering antennae, whether while in flight or after crawling on the labellum, triggering the ejection of the pollinarium, which is placed always on the dorsum of the bee's abdomen (Fig. 6A–B). The “loaded” bees then fly to the non-resupinate female flower (Fig. 7B), which they enter upside-down. As the bees move in and out of the deep labellum of the female flower, the pollinarium flexes, and eventually a pollinium is inserted in the stigmatic slit. It should be emphasized that bees are attracted to *Catasetum* flowers by particular fragrances, and that their movements inside *Catasetum* flowers have as ultimate goal the collection of these fragrances (Dodson, 1962).

In *Catasetum discolor*, bees approach the non-resupinate male flowers (Fig. 8A) and eventually land on the column; when the pollinarium is ejected, it is placed on the ventrum of the bee's thorax (Fig. 6C–D). The “loaded” bees then find the equally non-resupinate female flower, eventually landing, again, on the column, and after moving in and out of the shallow labellum of the female flower, a pollinium is inserted in the stigmatic slit.

It is more likely that in nature the pollen donor of the natural hybrid is *Catasetum discolor*. Firstly, it is unlikely that a bee carrying a pollinarium of *C. pileatum* will try to enter the shallow labellum of the female flower of *C. discolor* upside down (the only way the “loaded” bee could pollinate it, given that the pollinarium is on the dorsum of the bee); furthermore, the pollinia of *C. pileatum* is slightly too large to enter the stigma slit of the female flower of *C. discolor*. Manually, of course, a pollinium of *C. pileatum* can obviously be inserted forcefully in the stigmatic slit of a female flower of *C. discolor*, as was the case in the artificial cross we present here. In nature, this nothospecies is quite variable in color (ranging from pearly white to yellow suffused with red), and it has considerable horticultural value.

In the artificial hybrid the pollen donor was *Catasetum pileatum* (versus most likely *C. discolor* in the nothospecies). This difference did not seem to alter the resulting floral morphology: the two hybrids are undistinguishable (Fig. 5 versus Fig. 9). We perhaps would have expected differences,

as in plants all the extra-nuclear DNA (that in the chloroplasts and mitochondria) is strictly maternally inherited.

The artificial cross was performed by one of us (SPR), and the seeds were planted, *in vitro*, by another of the authors (REL). The seeds were planted January 2014 and the first flowering plants appeared in September 2017 (Fig. 9).

Of the parents of *Catasetum* × *dunstervillei*, *C. discolor* has by far the widest distribution: the Guianas (Cayenne, Surinam, and Guyana), the Venezuelan Guayana, and Colombia (Carnevali et al., 2007), and perhaps occurs in Bolivia and Brazil. *Catasetum pileatum*, however, is restricted to the Orinoco river basin in Colombia and Venezuela and the upper Rio Negro basin in Brazil, Colombia, and Venezuela. The hybrid has been reported from Colombia (Bonilla et al., 2016), Venezuela (herein and in literature cited), but it surely occurs in adjacent Brazil, perhaps in the upper Rio Negro basin.

It is curious that another natural hybrid, *Catasetum* × *roseo-album* (Hook.) Lindl. (Fig. 8B), most certainly between *Catasetum discolor* and *C. longifolium* Lindl. (Fig. 10), is by far more common than *Catasetum discolor* in the area where the authors have found plants of *C. dunstervillei*, both growing as an epiphyte, more commonly on palms or, rarely, as a terrestrial plant growing on granite outcrops (Romero and Carnevali, 1989, 1991b).<sup>6</sup> The dry pollinaria from this natural hybrid cannot be distinguished from those of *C. discolor*. This natural hybrid or nothospecies (i.e., between *Catasetum pileatum* and × *C. roseo-album*), was already suggested by Villegas (2002), providing a drawing and two photographs, as well as photographs of the putative parents. It would be interesting to artificially cross this other nothospecies (i.e., *Catasetum* × *roseo-album*) with *C. pileatum* to test Villegas's hypothesis.

Here we would like to add one final comment. Villegas (2002: 168) argued whether *Catasetum* × *roseo-album* was a natural hybrid or a “valid species” (“especie válida,” perhaps given “...Categoría de especie”; Villegas, 2002: 168).

First of all, *Catasetum longifolium* Lindl., which Villegas (2002: 168) doubted existed in the Colombian llanos, is a “cryptic” species, found close to the crown of *Mauritia flexuosa* palms, some of which can be up to 40 m tall; the plant of *C. longifolium* are pendent and the leaves, as the epithet implies, are long and also narrow and, from a distance, hard to distinguish from the leaves of the palm. We suspect that the distribution of *Catasetum longifolium* in northern South America, especially in Colombia, has been underestimated.

Second of all, the distinction between a “stable” nothospecies (which *C. xroseo-album* seems to be one) and a “species” is blurred, given that a large proportion of plant and animal species certainly seem to be of hybrid origin (Arnold, 1997; see also Lamichhaney et al., 2017). Most likely, stable natural hybrids (with a reticulate ancestry) create or invade their own, novel “adaptive peaks,” modeled by genetic drift or by local selective pressures acting over novel character combinations inherited from the parental taxa, eventually following independent evolutionary histories.

<sup>6</sup> *Catasetum* × *roseo-album* in fact, displaces one of the parents around Puerto Ayacucho, *C. longifolium*, from its typical habitat on *Mauritia flexuosa*. Nearby, in the basins of the Samariapo and Sipapo rivers, as well as in the upper Rio Negro basin, in the San Miguel river, where *Catasetum longifolium* is much more prevalent, always on *M. flexuosa*, *C. xroseo-album* is confined to other palms and rotten limbs of miscellaneous trees, and, as mentioned before, rarely found growing terrestrially on granite outcrops.

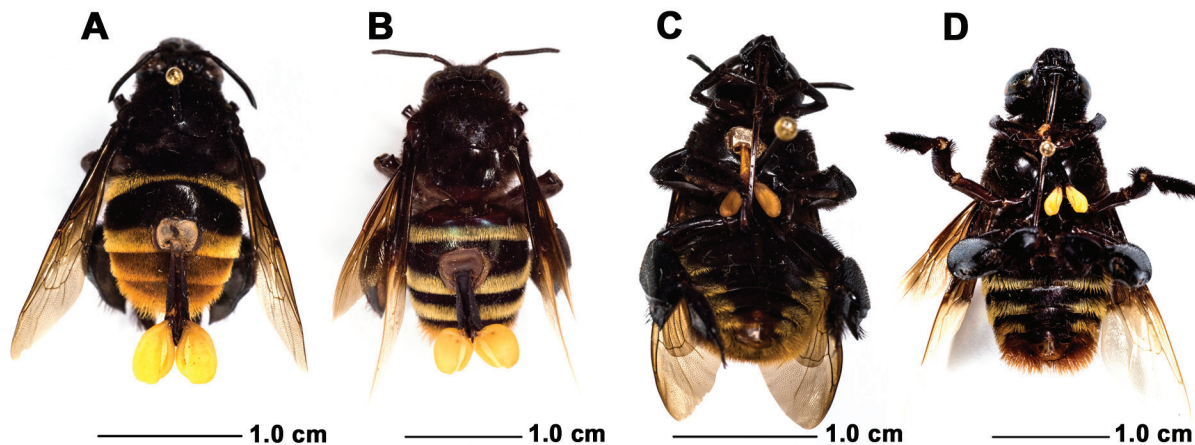


FIGURE 6. Pollinators of *Catasetum* species. A, *Eulaema cingulata* (Fabricius) bearing a pollinarium of *Catasetum pileatum* Rchb.f.; B, *E. meriana* (Olivier) bearing a pollinarium of *C. pileatum*; C, *E. cingulata* bearing a pollinarium of *C. discolor* (Lindl.) Lindl.; D, *E. meriana* bearing a pollinarium of *C. discolor*. The round, gold object in A, C, D, is the head of the entomological pin holding the bees; in C and D, the tongue or proboscis of the bees can be seen laying on top of part of the pollinaria, running along the axis of the bees from the head to the abdomen. Photographs by G. A. Romero-González based on bees in his personal collection.

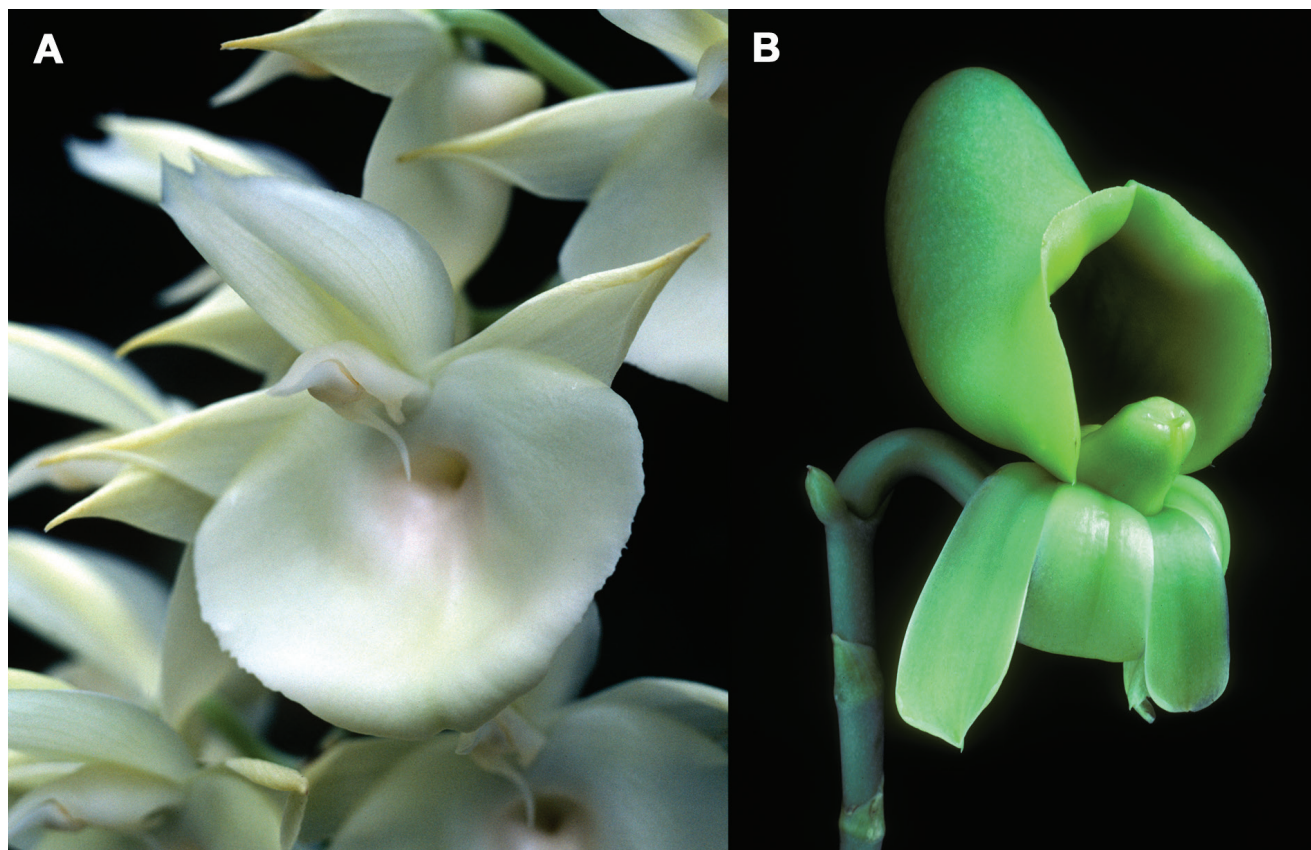


FIGURE 7. *Catasetum pileatum* Rchb.f. A, staminate (male) flower; B, pistillate (female) flower. Photographs by G. A. Romero at approximately the same scale (for precise scale, see figure 3).





FIGURE 8. *Catasetum* species and nothospecies. A, *Catasetum discolor* (Lindl.) Lindl., staminate (male) flower; B, *Catasetum* × *roseo-album* (Hook.) Lindl., staminate (male) flower. Photographs by G. A. Romero at approximately the same scale (for a precise scale, see figure 4).

#### LITERATURE CITED

- ARNOLD, M. L. 1997. *Natural Hybridization and Evolution*. Oxford University Press, New York.
- BONILLA, M. M., A. C. AGUIRRE, D. YEPES R., E. GALLEGO D., AND J. T. OTERO. 2016. *Catasetum* (Orchidaceae: Catasetinae) en Colombia: lista actualizada. *Revista Facultad de Ciencias Básicas* 12, No. 1: 22–35.
- DRESSLER, R. L. 1976. Venezuelan Orchids Illustrated, a monumental work. *Orquídea* (México) 6: 129–131.
- CARNEVALI, G., E. CHRISTENSON, E. FOLDATS, I. M. RAMÍREZ-MORILLO, G. A. ROMERO-GONZÁLEZ, C. A. VARGAS, AND M. WERKHOVEN. 2007. Checklist of the plants of the Guiana Shield, Orchidaceae. Pages 118–149 in V. FUNK, T. HOLLOWELL, P. BERRY, C. KELLOFF, AND S. N. ALEXANDER, EDS. *Checklist of the Plants of the Guiana Shield*. Contributions from the United States National Herbarium 55: 1–584.
- DODSON, C. H. 1962. Pollination and variation in the subtribe Catasetinae (Orchidaceae). *Annals of the Missouri Botanical Garden* 49: 35–56.
- DUNSTERVILLE, G. C. K. AND L. A. GARAY. 1966. *Venezuelan Orchids Illustrated volume IV*. Andre Deutsch, London.
- AND ———. 1979. *Orchids of Venezuela—An illustrated Field Guide*. Botanical Museum of Harvard University, Cambridge, Massachusetts.
- FOLDATS, E. 1969–1970. Orchidaceae I–V, and a separate general index, in T. LASSER, ED. *Flora de Venezuela*. Instituto Botánico, Caracas.
- LAMICHANEY, S., F. HAN, M. T. WEBSTER, L. ANDERSSON, B. R. GRANT, AND P. R. GRANT. 2017. Rapid hybrid speciation in Darwin's finches. *Science* DOI: 10.1126/science.aao4593.
- ROMERO G. A. AND G. CARNEVALI. 1989. Novelties in the orchid flora of southern Venezuela. *Annals of the Missouri Botanical Garden* 76: 456–461.
- AND ———. 1990. *Catasetum* natural hybrids from southern Venezuela—I. *Catasetum* × *tapiriceps* Reichb.f. *American Orchid Society Bulletin* 59, No. 12: 1214–1220.
- AND ———. 1991a. *Catasetum* natural hybrids from southern Venezuela—II. *Catasetum* × *dunstervillei* G. Romero & Carnevali. *American Orchid Society Bulletin* 60, No. 2: 115–120.
- AND ———. 1991b. *Catasetum* natural hybrids from southern Venezuela—III. *Catasetum* × *roseo-album* (Hook.) Lindl. and *C. xwendlingeri* Foldats. *American Orchid Society Bulletin* 60, No. 8: 770–120.
- AND ———. 1992. *Catasetum* natural hybrids from southern Venezuela—IV. Biology and nomenclature. *American Orchid Society Bulletin* 61, No. 4: 355–360.
- VILLEGAS V., F. 2002. *Catasetum pileatum* × *Catasetum roseo-album*—un híbrido natural de los llanos orientales de Colombia. *Orquideología* 22, 2: 165–168.



FIGURE 9. *Catasetum x dunstervillei* G.A.Romero & Carnevali, product of the artificial cross. Photographed by R. E. López.



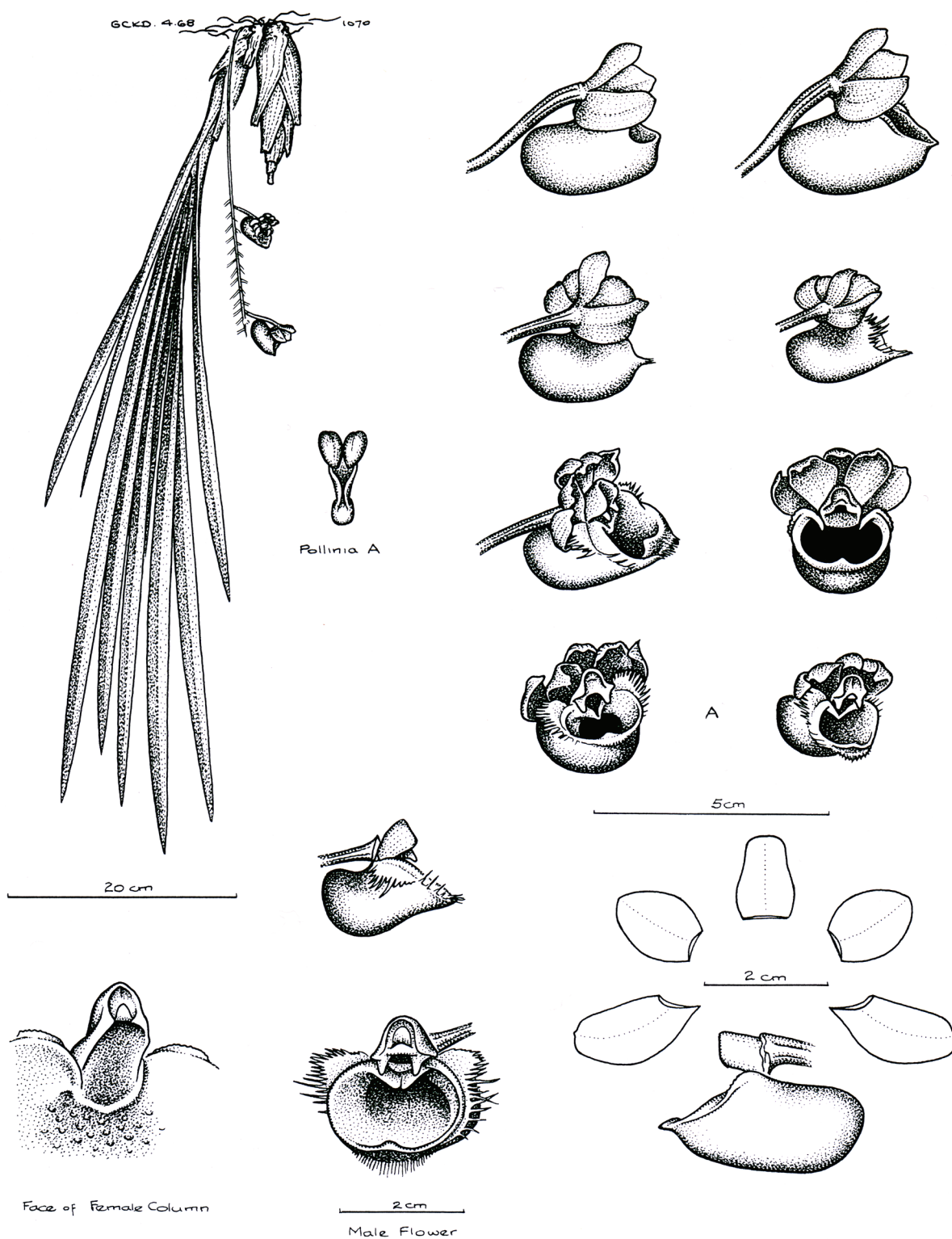


FIGURE 10. *Catasetum longifolium* Lindl. Drawing by G. C. K. Dunsterville based on *Dunsterville 1070*, apparently not preserved, photostat copy of original drawing at AMES.

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# MECONOPSIS LEPIDA AND *M. PSILONOMMA* (PAPAVERACEAE) REDISCOVERED AND REVISED

TOSHIO YOSHIDA<sup>1,2</sup> AND HANG SUN<sup>3</sup>

**Abstract.** Two little-known species of *Meconopsis* (Papaveraceae), *M. lepida* and *M. psilonomma*, first collected by Reginald Farrer on Gansu Min Shan, China, in 1914, were recently rediscovered and are here revised based on literature studies, field research and an examination of specimens. Accounts of the rediscoveries and detailed revisions are accompanied by explanatory photos, maps and tables. Two new varieties of *M. psilonomma*, var. *zhaganaensis* and var. *calcicola*, are described.

**Keywords:** *Meconopsis lepida*, *Meconopsis psilonomma*, *Meconopsis sinomaculata*, Reginald Farrer, Joseph Rock, Gansu (Kansu), Min Shan, Die Shan, Zhouqu (Siku)

Gansu Min Shan is located in the southern corner of Gansu (Kansu in Farrer, 1926) Province near the Sichuan border, China. The western part of Gansu Min Shan runs west-northwest to east-southeast along the boundary between Zhuoni (卓尼) Xian and Diebu (迭部) Xian, and is now called Die Shan (迭山). The northern slope of Die Shan is the watershed of the Tao He (Tao River), which flows to the Huang He (Yellow River). The eastern part of Gansu Min Shan is smaller than the western part, running northwest to southeast along the boundary between Dangchang (宕昌) Xian and Zhouqu (舟曲) Xian. The southern slope of Gansu Min Shan is the watershed of the Bailong Jiang (Bailong River), which flows to the Min Jiang (Min River) in Sichuan Province, which in turn enters the Chang Jiang (Yangtze) (Fig. 1–3). Gansu Min Shan has a unique flora, a mixture of northwestern Chinese plants and more southern and southwestern Sino-Himalayan plants such as *Meconopsis*.

Reginald Farrer, a British plant hunter and gardening

legend, often called “prince of alpine gardeners,” accompanied by William Purdom, an earlier British plant hunter in northwestern China, discovered *Meconopsis lepida* Prain and *M. psilonomma* Farrer (Papaveraceae) on Gansu Min Shan in 1914. Since then, no one has reported on these species in the region except Joseph Rock. Rock explored Die Shan extensively in 1925 and 1926 and was the second person to collect *M. psilonomma* at the type locality by following the route of Farrer and Purdom.

The travels of Farrer and Purdom in Gansu were described in Farrer’s *On the eaves of the world* published in 1926 in two volumes. The travels of Rock in this region were communicated in fragments and compiled in *Joseph Franz Rock—Phytogeography of northwest and southwest China* (Rock, 2010) and in Rock’s diaries preserved in the Royal Botanic Garden, Edinburgh, and transcribed in digital format and available on the website of the Arnold Arboretum of Harvard University (Rock, 2012).

## FIRST COLLECTION OF *MECONOPSIS LEPIDA*

*Meconopsis lepida* was first collected and photographed on June 20, 1914 on the mountain called Thundercrown by Farrer and now known as Leigu Shan (雷古山), which literally translates to Thunder Old Mountain, above Siku (now called Zhouqu), supposedly within the area marked A in Fig. 2. On a label of the type collection, *R. Farrer 123* (Fig. 4), Farrer wrote “*Meconopsis* sp. nova (to Fedde) *M. ‘Eucharis.’* This lovely plant of the Primulina group (description & photographs earlier) has only been seen on the cooler slopes & rock ledges of the high limestones on Thundercrown from 12–13,000 ft. It was in splendor on June 20: practically all the seed was gone from the elongate narrow glabrous (or very sparsely haired) capsules by August 27. Species infaustissime biennis.” A black and white photo of the flowering plants is in vol.2, p.16–17 (Farrer, 1926).

Farrer (1919: 506) also described the habitat of *M. lepida* in his *The English Rock-Garden* as follows: “*Meconopsis*

sp. (F 123) (*M. lepida*, sp. nova) inhabits the upper alpine banks and ledges on Thundercrown, markedly preferring the cooler westerly aspect. It is not found in the open turf, but often occurs at its fringes round the base and up the gullies of little limestone outcrops in the huge grassy flanks of the mountain at 12,500 feet, not steadily abounding, but appearing in sporadic outbursts.”

Farrer recorded phonetic spellings of the local name of Thundercrown as Lei-gor S’an in Farrer (1926) and Lei-Go-S’an on the specimen label. The English name, Thundercrown, was supposedly translated from 雷冠山, which is written Leiguan Shan in *Pinyin* transliteration and literally means Thunder Crown Mountain. Leiguan Shan (雷冠山) may be the origin of Leigu Shan (雷古山). There occur frequent thunderstorms with torrential rain in summer on the south-face of the mountain. One such deluge caused huge debris flows and brought devastating damage to the town of Zhouqu on August 8, 2010.

We are grateful to members of the Blue Poppy Society, Japan, and National Key Research and Development Program of China (grant no 2017YFC0505200 to Hang Sun) for financial supports of the field research. Special thanks go to Dr. Xu Bo, Southwest Forestry University, Kunming, for his assistance in the field and for identifying the plants. The curators of the herbaria in Edinburgh (E), Kunming (KUN) and London (BM and K) are thanked for facilitating the study of types and other specimens.

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FIGURE 1. Gansu Min Shan and neighboring region, based on Google Maps.

#### FIRST COLLECTION OF *MECONOPSIS PSILONOMMA*

The type locality of *Meconopsis psilonomma* is in the watershed of Dayugou (大峪沟), supposedly within the area marked C in Fig. 3. Farrer and Purdom left the town of Zhuoni (卓尼; Jo-ni in Farrer, 1926) on July 27, 1914 and entered Boyugou (博峪沟; Bao-u-go in Farrer, 1926), then crossed over an eastern spur and down to Dayugou. After an accident resulting in Farrer's fall with his horse into the stream from a half-broken wooden bridge, they reached Ajiao (阿角; Ardjery in Farrer, 1926) on the western shore of upper Dayugou just below the confluence of two tributaries, Dagou (大沟; meaning large valley) from the south and Xiaogou (小沟; meaning small valley) from the southeast.

Dagou carries a large amount of furiously flowing water through a narrow gorge, along which there is no passable route. In contrast, Xiaogou ('Main valley' in Farrer, 1926) carries a smaller amount of water in the bed of a wide valley along which a trail runs toward the head of the valley and over a pass named Thari Khikha on the main ridge of easternmost Die Shan. *Meconopsis psilonomma* supposedly grew somewhere on the north side of the ridge within the area marked C.

Farrer and Purdom waited at Ajiao from July 29 or 30 until tents for their army escort arrived from Zhuoni. During their days of wait, Farrer explored a ridge between Dagou and Dibugou (地布沟; Ch'i-pu kou in Rock, 2010, 2012), the westernmost tributary of Dayugou, whereas Purdom reconnoitered Xiaogou to find good campsites. It is

suspected that Purdom, in fact, collected the type specimens of *M. psilonomma* during those days, because the collection was dated July 30, 1914. The photo of *M. psilonomma* in Farrer's book was also supposedly taken by Purdom on this occasion, because the plants in the photo resemble the type specimen and do not appear to be rain laden as mentioned by Farrer in *The Gardeners' Chronicle* quoted below. Purdom was also engaged as photographer during their travels, although it has been stated in most of the literature that Farrer collected the specimens of *M. psilonomma* and photographed the plants in the field.

Farrer and Purdom finally departed Ajiao on 3 August, heading toward the head of Xiaogou with an army escort of 40 men dispatched by the local government at Zhuoni to prevent attack from Tepos, meaning the Tibetans of upper Diebu Xian centered at Zhagana (扎尕那). On the following day, 4 August 1914, Farrer came upon clusters of *M. psilonomma*, although the plants appeared to mostly past flowering in early August. Farrer (1915) described his new species in *The Gardeners' Chronicle* as follows:

"And then, among these suddenly a fresh tone—a great bent flower, rain-laden and heavy, like a gigantic specimen of the purple *Anemone coronaria*. It was another new *Meconopsis* (new, at least, to Fedde, for I do not know the diagnosis of *M. wardii*). Like the last, it belongs to the biennial Primulina group; but, leaving to









FIGURE 4. Type specimen of *Meconopsis lepida* Prain, R. Farrer 123. Royal Botanic Garden, Edinburgh.

the last its monopoly of small and dainty grace, this one stands pre-eminent in grandeur and opulence. Few and small are the leaves, all at the base, glaucous, narrow, almost hairless; the naked scape is invariably solitary, and invariably carries only one very large flower with six, seven, or eight very broadly ovate rhomboidal, crimped petals of rich lavender purple. The solitary imperial eye of colour at the top of each stout scape of 6 to 10 inches reminded me of the “solitary eye” which blind old Oedipus said they had torn from him when they took away Antigone; accordingly, until it is put in its place or more authoritatively and illustriously named, I think of this treasure as *Meconopsis psilonomma*.”

Farrer (1926) also described it in his book as follows [The words in parenthesis marked with \* in the following quotations were inserted by the present authors]:

“In grandeur and opulence the Lonely Poppy (\**M. psilonomma*) takes high rank above the Dainty Poppy (\**M. lepida*), to whom is still left the pre-eminence in small and dainty grace; for the Lonely Poppy on its single and always solitary stem bears always only a single purple flower, whose great head, when bowed by rain, makes one think immediately of *Anemone coronaria* in the flower-fields of Southern Europe. It is a glorious thing to see in those high meadows of the Tibetan Alps; and I never saw it anywhere else, or on any day but this. No doubt but it has many other homes on those untrodden downs, but it was remarkable to find how limited a space it occupied on the green mountain-wall above our camp, though so abundant from eleven thousand feet upwards to the final arête, that now among the general jewelwork of the shimmering lawns it made quite a dappling of rich violet blots, its stem of six or eight inches aspiring above the rest, and its noble blossom modestly declining in the rain instead of standing erect in its usual bravery of expanded beauty. In the final arête it is yet more splendid. Almost all other flowers have ceased except the Harebell Poppy (\**M. quintuplinervia*), which here looks anaemic and feeble beside its radiant new cousin; and the ridge runs in steps and ripples of dank raw earth overhung with a thatch of soaking moss and matted Rhododendrons in brownish autumnal tones. And here, in all the

opener lips and edges, shine the flowers of the Lonely Poppy, more imperial than ever in rich purple against the white pallor of the fog, upon their background of dull vague tones of brown and green.”

It is hardly believable that flowers of a scapose species of *Meconopsis* such as *M. psilonomma* were abundant in early August below 4,000 m elevation. At any rate, Farrer saw the flowers declining after the rain at that time.

The dried and pressed plants of Farrer’s type specimen, *R. Farrer* 255, in the herbarium of the Royal Botanic Gardens, Kew, was, unfortunately, stolen, leaving only a partly water-colored drawing (Fig. 5) of the type specimen. An isotype (i.e., bearing the same collection number) is in the Royal Botanic Garden, Edinburgh (E). The broken and somewhat crumpled plants with an old flower and two fruit capsules together with a black and white photo of the plants, which is also in Farrer (1926, II: 168–169), comprise the specimen at E. The following note written by Farrer himself is attached to that specimen:

“*Meconopsis* sp. nova (to Fedde) ‘*M. psilonomma*.’ A very indifferent specimen (the set having been stolen) of a superb species seen only once, on one portion of a great grass slope in the Thibetan Alps of Ardjeri, beginning at the topmost limit of *M. punicea* (11,500 feet), and ascending to the highest ridges at 12,500 feet, where *M. quintuplinervia* seemed pale and poor: - scattered freely in the grass, with *Allium kansuense*, *Gentiana* 217, *Primula* 13, and *P. tangutica*, etc. July 30: seed mid-September. Note, that it is invariably single-scaped and single-flowered: this specimen quite understates its size and stature.”

As indicated on the note, the type specimens are considered to be inferior, late flowering plants in lesser stature than most of the plants in the region, which had already finished flowering. The drawing of the type specimen at K and the photo mounted on the isotype specimen of *M. psilonomma* show that the flowers are lateral facing, open flat, and are borne singly on an erect, shorter scape.

Farrer considered the flowers of *M. psilonomma* to be “bowed” and “modestly declining” by the rain when he observed them on 4 August, “instead of standing erect in its usual bravery of expanded beauty.” He wrongly supposed that the scapes would be erect and the flowers would open widely to show the “bravery of expanded beauty” in fine weather. However, it is now known, based on the second collection of *M. psilonomma* by Rock and from our studies, that the flowers of *M. psilonomma* are usually cup shaped and normally bowed, as mentioned below.

#### SECOND COLLECTION OF *MECONOPSIS PSILONOMMA*

Rock visited the locality of *Meconopsis psilonomma* on July 7, 1925 and made a second collection of the species, *J. F. Rock* 12613 (Fig. 6). Rock’s observations on the flora of the alpine meadows around Tsari Khikha are recorded in his book (Rock, 2010: 75) as follows:

“The flora of the alpine meadows was very poor in comparison to that of Kuang-k’e (\*Guangke 光克) Shan, but certain plants occurred here which were peculiar to the eastern end of the range, as *Meconopsis psilonomma* Farrer, a very





FIGURE 5. Drawing from the type specimen of *Meconopsis psilonomma* Farrer, *R. Farrer* 255. Royal Botanic Gardens, Kew.





FIGURE 6. Rock's specimen of *Meconopsis psilonomma* Farrer, J. F. Rock 12613, collected at the type locality. Royal Botanic Gardens, Kew.

distinct species which could never be mistaken for any other of the lavender or purple species of *Meconopsis*. To begin with, the flowering stalks are terete and hollow, spiny-haired, the spines dark red, the plant is 1-2 feet tall, the flowers are quite large semi-drooping and deep purplish blue, they are suspended from the very tip of the stalk in such a way as to appear artificially attached and not contiguous with the stem. It only occurs on Tsa-ri Khi-Kha in thick turf, most difficult to uproot, at 12,500 feet elevation and nowhere else. Farrer's Ardjeri is A-Chüeh (\*Ajiao; 阿角), and it is precisely there where it grows. At Tsa-ri Khi-Kha it meets *Meconopsis quintuplinervia* Reg., a much less robust species, very easily uprooted, with solid, not hollow stem, smaller flowers and much paler in color, and the red *Meconopsis punicea*."

According to Rock's field observations of *M. psilonomma*, the scapes are suddenly bent at the tip and the solitary flower is "semi-drooping," or "suspended," from the tip of the scape. Contrary to Rock's description, *M. psilonomma*, which is usually biennial, is easily uprooted, as can be surmised from the small dauciform taproot in Rock's specimens, whereas *M. quintuplinervia* is difficult to uproot because of the very hard, long, branched perennial roots. Rock could have mixed up these species.

Rock arrived at Ajiao (Adjuan in his diary) on June 30, 1925. After heavy rain, he set off for the head of Xiaogou on July 5. He wrote in his diary as follows:

"July 6. Set off for Tsarekhikha (\*Tsari Khikha) accompanied by 10 Tebbu (\*now transliterated as Diebu, 迭部) men with flint and steel lighted guns. Robbers in the neighborhood. At 9,450 feet defile was impassable because of water. Tebbu men made a bridge of larch and willow and dammed the water. — On to Lissedzadza: through Shimen. Rocks of conglomerate thousands of feet high on both sides, —. Ascended steep slopes of ravine. Saw herd of blue sheep; continued along 11,700 feet cliff. Caravan arrived and tents pitched. Met an old man who reported he had been beaten by five Tebbu Tibetan robbers. He stayed at camp. Robbers on other side of ravine. Rock fired his Colt 45 before he retired, to ward off robbers."

"July 7. Very little to collect but specimens # 12611–12620; shot a few birds; took some

photographs of high forested peak — Lidza tong, elevation 11,750 feet. Photographs looking south toward Shimen. Rock's men had gun exchange with robbers. One of the men shot by robbers; one robber shot dead by one of the Tebbu boys. Broke camp and decided to go to Minchow (\*Min Xian, 岷县), one and a half day's distant, but bogged down by rain and returned to camp. Later set off for Choni (\*Zhuoni卓尼). Camped in a meadow amidst lovely flowers. Poor vegetation on Mt. Lissedzadza."

Shimen (石門, stone gate) is a narrow gorge between huge rocks. There are several places called Shimen in Die Shan. The best-known Shimen in Die Shan is located at the head of Kachagou.

"July 8. Left camp. Elevation 10,200 feet, heading for Chan Chan nyi (\*Zhanzhanni, 占占尼). Reached Adjuan without difficulty. The man wounded by robbers was carried on a litter."

It is quite believable that Rock collected his specimen numbered 12613 at the same locality as the type specimen of *M. psilonomma*, *R. Farrer* 255, because both Farrer and Rock similarly mentioned that they saw the plant in a limited small area at the head of Xiaogou and saw it nowhere else.

Rock noted on the label of the specimen: "Tao River basin: alpine meadows on Mt. Lissedzadza. Alt. 12,500 ft. Plant 1–1.5 ft. deep lavender purple, especially at base of corolla. Stem hollow."

"Lissedzadza" in Rock's diary and on the specimen label appears to mean the mountain with limestone outcrops around Tsari Khikha on the main ridge of easternmost Die Shan.

It is considered that Rock collected the plants during one of the best flowering seasons for the species. *J. F. Rock* 12613 represents the more typical plants of the species, with greater stature, thick scapes and cup shaped, semi-drooping, larger flowers than Farrer's specimen, *R. Farrer* 255.

Christopher Grey-Wilson (2014) included Rock's specimen, *J. F. Rock* 12613, within *Meconopsis sinomaculata* in his monograph of *Meconopsis*. If Grey-Wilson is correct in his identification, *M. sinomaculata* should be treated as a synonym of *M. psilonomma* because Rock's specimen proves to be *M. psilonomma*, which has priority over *M. sinomaculata*. *Meconopsis sinomaculata* was published by Grey-Wilson in 2002 based on a specimen (*SBQE* 500) collected at Gonggaling (贡嘎岭; Gonggan Len Pass in Grey-Wilson) in northern Sichuan.

#### PRELIMINARY RESEARCH IN GANSU MIN SHAN IN 2014

The mountainous regions of Zhouqu Xian, where the type locality of *Meconopsis lepida* is located, and in Zhuoni Xian, where the type locality of *M. psilonomma* is located, have been closed to foreigners despite China's reform policies of opening to the outside world promoted after the 1980s.

One of the authors (Yoshida) visited the areas open to foreigners in Gansu Min Shan in the summer of 2014, as a leader of a collaborative botanical team made up of the Blue

Poppy Society, Japan, and the Kunming Institute of Botany, Chinese Academy of Sciences.

On July 22 and 23, on the way from Zhagana to 34°16'14"N, 103°03'57"E, marked E in Fig. 3, Yoshida found a solitary-flowered, scapose, blue poppy (*T. Yoshida* K96) sparsely scattered among herbs and dwarf shrubs of *Potentilla* L. near the top of southwest-facing, partially shaded, partly moss-covered steep banks beside the road from 3,500 to 3,800 m elevation. It was not easy to find



the plants, because most had finished flowering and bore a narrowly ellipsoid, bristly or glabrous fruit on an elongate solitary scape (Fig. 7), and because of the partially shaded habitat as well.

The plants still in flower at this site had small leaves, half nodding, cup shaped, large flowers with filaments dilated toward the base and tightly surrounding the ovary at least at the base, and petals with a prominent deeply colored blotch at the base (Fig. 8). The plants resembled *Meconopsis sinomaculata* as described by Grey-Wilson and also Rock's specimen of *M. psilonomma*, J. F. Rock 12613, in appearance. However, our studies found that the anthers of these plants are dull orange or dull yellow and not blackish purple as in *M. sinomaculata*, and fruiting capsules of the plants are narrowly ellipsoid and not ellipsoid as in typical *M. psilonomma* and *M. sinomaculata*.

During the following day, Yoshida observed many flowering plants (*T. Yoshida* K97) resembling *M. sinomaculata* (*M. psilonomma*), but with shorter scapes, on open, rocky, limestone slopes, often on moss-covered thin earth beside the rocks, occasionally near the rock ledges, around Point E at 4,000 to 4,150 m elevation near the top of the main ridge of westernmost Die Shan. Most of the plants in this habitat had laterally facing, shallowly cup-shaped flowers (Fig. 9–10). A few of the plants had widely-opened or dish-shaped flowers with much shorter scapes (Fig. 11). The plants in this habitat had filaments scarcely

dilated or slightly dilated toward the base and radiating or loosely surrounding the ovary. No fruits were seen on 24 July. Despite the open habitat, the flowering season of this population was apparently later than that of *T. Yoshida* K96.

The ragged limestone outcrops of the main ridge of Die Shan around Point E appeared to be similar to the area at the head of Dayugou as described by Farrer and Rock. The habitat of the plants (*T. Yoshida* K96, K97) growing near Point E were located on the southwest or west facing steep slopes of westernmost Die Shan at the head of the Bailong Jiang (Chang Jiang) river system, whereas the supposed type locality of *M. psilonomma* marked D is located on the north side of easternmost Die Shan at the head of the Tao He (Huang He) river system. Point E is located some 50 km west of point D.

On alpine slopes in this region at the head of a tributary of Bailong Jiang, at 3,200 to 4,200 m elevation, Yoshida also found plants of *Gentiana spathulifolia* Maxim. ex Kusnez., *Aconitum gymnandrum* Maxim., *Parnassia oreophila* Hance, *Parnassia trinervis* Drude, *Primula gemmifera* Batal. var. *gemmifera*, *Delphinium pylzowii* Maxim. var. *trigynum* W. T. Wang, *Corydalis dasyptera* Maxim., *Androsace brachystegia* Hand.-Mazz., *Saxifraga tangutica* Engl., *Potentilla biflora* Willd. ex Schlecht. var. *lahulensis* Wolf, *Arenaria przewalskii* Maxim. and *Saussurea erubescens* Lipsch. Interestingly, many of these plants of northwestern China are rare or absent in Sichuan.

#### REDISCOVERY OF *MECONOPSIS LEPIDA* IN 2016

In 2016, one of us (Yoshida) explored the northwestern slopes of Leigu Shan, Dangchang Xian, which is open to foreign travelers, and on July 16 rediscovered *M. lepida* (Fig. 12–16) above a gulley near Yazitan (鸭子滩), at the point, 33°53'36"N, 104°19'20"E, alt. 3,500 m, marked B in Fig. 2. It is within 7 km northwest of the supposed type locality of *M. lepida*. Although one of type specimens, *R. Farrer* 123, bears 6 flowers in abnormal positions, the plants at this location have 1–4, often 2, bluish purple, half nodding flowers borne mostly on the upper half of the plant. They do not have basal flower buds. The flowers have pale yellow, elliptic or rounded anthers with incurved thecae and with broadened, membranous connectives at the center, as seen in Fig. 15. In these characters, *M. lepida* is distinctly different from the related *M. lancifolia*, which usually has basal flower buds, magenta purple petals and yellow or orange, short oblong anthers with straight thecae.

As described by Farrer, *Meconopsis lepida* at Point B also appears to prefer “the cooler westerly aspect” and “it is not found in the open turf, but often occurs at its fringes round the base and up the gullies of little limestone outcrops —,

not steadily abounding, but appearing in sporadic outbursts.”

Yoshida did not find *M. lepida* elsewhere on the accessible slopes in this region around Yazitan.

*Meconopsis lepida* grows among limestone rocks, near rock ledges and beside shrubs of *Rhododendron* L. on southwest-facing mossy slopes together with *Primula aerinantha* Balf. f. & Purdom, *Bistorta vivipara* (L.) S. F. Gray, *Hedysarum tanguticum* B. Fedtsch., *Cremanthodium* sp. and other herbs.

Around the foot of the gulley, large clumps of *Meconopsis quintuplinervia* Regel and *Allium chrysanthum* Regel grew in abundance, and *Fritillaria przewalskii* Maxim., *Corydalis curviflora* Maxim. ex Hemsl., *C. potaninii* Maxim., *Cypripedium guttatum* Swartz and other herbs were seen among shrubs of *Rhododendron* and *Spiraea* L. Although it was too early for the flowers, dense, pure colonies of *Chamerion angustifolium* (L.) Holub widely occupied southeast-facing slopes near grassy ridges around the foot of the gulley; such a large colony of *C. angustifolium* is not rare in the higher latitude regions of the northern hemisphere, but is rarely seen in the Sino-Himalaya region.

#### REDISCOVERY OF *MECONOPSIS PSILONOMMA* IN 2016

On July 20, 2016, Yoshida set off trekking from Zhagana toward the head of Dayugou with a local Tibetan guide and his friend who held the reins of a yak carrying their camping equipment. The guide knew the local plants of *Meconopsis* very well and promised to take Yoshida to the habitat of *M. psilonomma* at the head of Dayugou to see flowers as shown in photos of *R. Farrer* 255 and *J. F. Rock* 12613.

Most alpine meadows along the main ridge of Die Shan, including its northern side, belong to Diebu Xian, and are used for grazing yaks and sheep.

Zhagana is now becoming a center of tourism in Die Shan, with many guesthouses and hotels newly constructed or under construction. Most Tibetan people around Zhagana, who were once feared by Farrer and Rock, appear



FIGURE 7. *Meconopsis psilonomma* var. *zhaganaensis* T. Yoshida & H. Sun in fruit, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K96.





FIGURE 8. *Meconopsis psilonomma* var. *zhaganaensis* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 23, 2014, specimen preserved in T. Yoshida K96.





FIGURE 9. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.





FIGURE 10. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.





FIGURE 11. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.

to be peace-loving Buddhists. The two men accompanying Yoshida loved their land and gathered the lavish litter left by trekkers on the way to their destination.

They walked along the southern flank of Die Shan, then beyond the pass called Kalake (卡拉克) Yakou on the main ridge of Die Shan in a northern direction. On July 24, they finally reached their destination, the habitat of the solitary-flowered scapose blue poppy (Fig. 17–21). The habitat is not close to Tsari Khikha at the head of Xiaogou (小沟), the type locality of *M. psilonomma*, but is located around the pass called Donsari Khikha at the point, 34°18'12"N, 103°26'21"E, marked D in Fig. 3, on the dividing ridge between Dagou (大沟), the western tributary of Dayugou (大峪沟), and the eastern tributary of Kachegou (卡车沟). The Tibetan guide said that to reach the head of Xiaogou it would be necessary to wade across a stream, but at the time it was flooded and impassable due to the monsoon rains. He also indicated that the area was not part of their land.

On the way from Dzagana to Donsari Khikha along the southern flank of the main ridge composed of limestone outcrops, *Meconopsis integrifolia* (Maxim.) Franch. was in fruit without exception, and *M. punicea* Maxim. was also in fruit except for a few plants with large scarlet flowers waving like banners. Some plants of *M. racemosa* Maxim. were in fruit, whereas others on windblown scree near the ridge were in flower.

Point D is located some 15 km west-northwest of the supposed type locality of *M. psilonomma*, within the same valley-head of Dayugou. The blue poppy growing around Point D appears similar to the specimens of *M. psilonomma* collected at the type locality and considered to be typical plants of *M. psilonomma*, based on common features of the plants and the topography. Many features of *M. psilonomma* have been newly observed from living plants growing around Point D and from the dried specimens.

The majority of the plants of *Meconopsis psilonomma* in this region grow with *Ranunculus* L., *Potentilla* L., *Bistorta* Scop., *Anaphalis* DC., *Trigonotis* Stev., *Veronica* L., and other herbs on northwest-facing, partly moss-covered grassy slopes at around 3,750 m elevation. The slopes are scattered with dwarf shrubs of *Rhododendron* and *Salix* L. Some individuals of *M. psilonomma* grow close to the dwarf shrubs with their scapes protruding through the intricate canopy of the shrubs. The flora of the region around Donsari Khikha is poor in comparison with the area at Point E, as Rock mentioned about Thari Khikha, seemingly because of the drier climate and gentle topography around the passes.

Yoshida saw *Meconopsis psilonomma* only in the area around Point D, as did Farrer and Rock in the limited area around Tsari Khikha at the head of Xiaogou, and nowhere else.

In the region around Point D, some individuals of *Meconopsis psilonomma* were on the eastern slopes close to the grassy crest of the ridge of Donsari Khikha, but the majority of the population around Point D was on the western slopes. Many of the plants on both sides had already finished flowering and bore ellipsoid or obovoid fruits on erect scapes, but not a few plants still had flowers. The flowers were mostly cup shaped and usually facing laterally

or half nodding, but a few of the cup-shaped flowers were upright and appeared old. The filaments of the flowers were dilated in the lower half and tightly surrounded the ovary. A few flowers of the smaller plants were open, dish shaped and lateral facing or upright. The filaments of the dish-shaped flowers were sometimes scarcely dilated and loosely, not tightly, surrounding the ovary (Fig. 19). Farrer's specimen appears to be one such small plant. Other features of the plants were similar in appearance to *R. Farrer* 255 and *J. F. Rock* 12613, and also to plants growing around Gonggaling and Point E.

The petals of *M. psilonomma* around Point D (Donsari Khikha), however, were pale purple or lavender purple and gradually deeper colored and bluish near the base and without a prominent blotch. The petals of *Meconopsis sinomaculata* (Fig. 22–26) and the plants around Point E (*T. Yoshida* K96, K97) were purple or deep purple and had a prominent dark purple blotch at the base. The anthers of *M. psilonomma* growing around Point D were dull yellow, as were those of *T. Yoshida* K96 and K97, and not blackish purple as in *M. sinomaculata*. The fruiting capsules were mostly ellipsoid as in *M. sinomaculata* and *T. Yoshida* K97 and not narrowly ellipsoid as in *T. Yoshida* K96.

Our collaborative studies of these plants have revealed that *M. sinomaculata* is a variety of *Meconopsis psilonomma*, as published by Hideaki Ohba in 2006, and the collections *T. Yoshida* K96 and K97 are also varieties of *M. psilonomma*.

*Meconopsis lepida* is characterized below with additional details of the features observed in the plants growing at Point A and the specimen, *T. Yoshida* K108, collected at that point.

***Meconopsis lepida*** Prain, *Bull. Misc. Inform. Kew* 1915, No. 4: 158. 1915. TYPE: CHINA. S Gansu, Mountains of Thundercrown (Lei-go-shan), Siku Alps, 12–13,000 ft, June 1914, *R. Farrer* 123 (Holotype: E; Isotypes: BM, K). Fig. 4, 12–16.

Synonym: *Meconopsis lancifolia* sensu Taylor, *The Genus Meconopsis* page 87. 1934, *pro parte*. *Meconopsis lancifolia* (Franch.) Franch. ex Prain subsp. *lepida* (Prain) Grey-Wilson, *The Genus Meconopsis—Blue poppies and their relatives*, p. 324. 2014.

Monocarpic herbs, 14–33 cm tall. *Taproot* dauciform or napiform, 4–7 cm long including slender extensions, 6–9 mm across, contracted at head. Entire plant sparsely or moderately covered with bristles, or sometimes glabrous; bristles rather narrow and weak, to 2.5 mm long, patent or retrorse on stem and rachis. *Stem* (below uppermost leaf) simple, 1–4 cm long, 1.5–3 mm across. *Leaves* crowded near base, petiolate; petiole membranous, linear, 1.5–6 cm long, 1–2 mm wide; lamina elliptic, narrowly ovate or oblanceolate, 1.5–6 cm long, 4–8 mm wide, base cuneate or attenuate, margin entire, apex obtuse or acute, both surfaces sparsely bristly or glabrous. *Inflorescence* shortly racemose, without basal flowers; *flowers* 1–4 (5), often 2, mostly on upper half of plant, ebracteate, half nodding, dish shaped or shallowly bowl shaped, 2.5–4.5 cm across; pedicel 2.5–7 cm long on terminal flower, 0.7–2.5 cm long on lateral flowers, warty toward apex, abruptly swollen at base of calyx; calyx 9–11 mm long; petals 6–9, violet, pale purple or bluish





FIGURE 12. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.





FIGURE 13. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.





FIGURE 14. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.





FIGURE 15. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.

purple, ovate, elliptic or narrowly obovate, 15–25 mm long, 6–14 mm wide, base cuneate, margin entire or serrulate near apex, sometimes wavy, apex obtuse or acute; stamens numerous, filaments filiform, similar to petals in color, 4.5–8 mm long, anthers elliptic or rounded, 1–1.4 mm long, 0.8–1.2 mm wide, thecae pale yellow, incurved, connectives surrounded by incurved thecae similar to thecae in color, tinged with brown after discharging pollen; ovary ellipsoid, 5–8 mm long, 2.5–4 mm across, sparsely or moderately bristly, or glabrous; style 1.5–2 mm long; stigma ovoid, 1–2 mm long, 0.7–1.5 mm across, 4–6 lobed. *Young fruiting capsules* narrowly ellipsoid; mature fruits unknown.

**Distribution and habitat:** CHINA. S Gansu: Zhouqu Xian and Dangchang Xian, around Leigu Shan (Thundercrown), 3,450–3,900 m; beside rocks and shrubs of *Rhododendron* L. (Ericaceae), near rock ledges, above tree line on more or less west-facing, semi shaded, steep, grassy slopes of limestone mountain; rooting in moss-covered humus.

**Additional specimens examined :** CHINA. S Gansu: above a gully near Yazitan, northwestern side of Leigu Shan

(Thundercrown), Dangchang Xian, 33°53'36"N, 104°19'20"E, alt. 3,500 m, July 16, 2016, T. Yoshida K108 (KUN, TI).

George Taylor (1934) included *Meconopsis lepida* in the conglomerate species *M. lancifolia sensu* Taylor. Christopher Grey-Wilson (2014) treated *M. lepida* as a subspecies of *M. lancifolia*. *Meconopsis lepida*, however, clearly differs from *M. lancifolia* (Franch.) Franch. ex Prain in the inflorescence, color, shape of thecae and other features as shown in Table 1.

*Meconopsis psilonomma*, including varieties, is characterized below with additional features observed in the field and herbaria. The type specimen, *R. Farrer* 255, is considered to be a late season, non-representative individual, flowering at a reduced stature, and, as mentioned, the original set of specimens was stolen, leaving only a water color drawing of the plant. Nonetheless, the Rock specimen (i.e., *J. F. Rock* 12613), collected at the same locality as the type collection, seemingly during the peak flowering season, is designated here as an epitype to compliment the holotype on which the drawing was based.





FIGURE 16. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.

TABLE 1. Comparison of major features separating *Meconopsis lepida* from *M. lancifolia*.

	<i>M. lepida</i>	<i>M. lancifolia</i>
Taproot	dauciform or napiform	Dauciform
Stem and rachis	Thinner, less hairy	Thicker, often densely or moderately hairy
Hairs	Narrower, shorter and weaker	Thicker, longer and harder
Lamina	Elliptic, narrowly ovate or oblanceolate, thinner and soft in texture, yellowish green and upper surface not glossy, margin flat, sparsely hairy or glabrous	Usually strap shaped, broadly linear or oblong, thicker and firm in texture, dark green and upper surface somewhat glossy, often wavy and incurved in the margin, moderately or sparsely hairy, rarely glabrous
Inflorescence	Short racemose, without basal flowers; flowers 1-4(-5), often 2, usually on upper half of plant	Racemose, usually with basal flowers; flowers (2) 3-7 (8)
Petal color	Usually bluish purple	Usually magenta purple
Pedicels	Warty toward apex	Rarely warty toward apex
Anthers	Elliptic or rounded	Short oblong
Thecae	Pale yellow, incurved	Yellow or orange, straight
Habitat	Less exposed to sunshine and wind; rooting in soft, wet soil covered with moss	Often in open and exposed to strong wind; rooting in drier soil mixed with gravel and roots of other plants

*Meconopsis psilonomma* Farrer, *Gard. Chron.* Ser. 3, vol. 57: 110. 1915. TYPE: CHINA. S Gansu, Min Shan, above Ardjeri, July 30, 1914, *R. Farrer* 255 (Holotype: K (lost); Isotype: E); S Gansu, Mt. Lissedzadza, 12,500 ft., July 7, 1925, *J. F. Rock* 12613 (Epitype: A; Isoepitypes: BM, E, K).

Monocarpic herbs, when in flower, 13–50 cm tall, when in fruit, to 60 cm tall. *Taproot* dauciform or narrowly napiform, 1–4 cm long, 0.6–1.3 cm across, contracted at head, distally extended with slender roots. Entire plant covered with bristles; bristles to 3(–4) mm long. Stem (below uppermost leaf) simple, 1–5 cm long. *Leaves* crowded near base of plant, petiolate; petiole membranous, broadly linear, 1.5–7.5 cm long, 1–3 mm wide; lamina oblong or oblanceolate or lowest small leaves obovate, 1.5–8 cm long, 0.5–2 cm wide, base attenuate, or occasionally cuneate in lowest leaves, margin entire, apex obtuse, acute or rounded, both surfaces moderately or sparsely hairy. *Inflorescence* scapose with solitary scapes and solitary flowers; scapes 2–7 mm across when fresh, 1.5–6 mm across when dried, densely retrorsely or patently bristly, hollow in larger plants. *Flowers* usually cup shaped, lateral facing or half nodding, occasionally dish shaped and lateral facing or upright in small plants, 3–7 cm across. *Calyx* 1.2–2 cm long, densely bristly. *Petals* 5–7(or 8), pale purple, lavender purple, purple or deep purple, deeper colored toward base, with or without prominent dark purple blotch, obovate, broadly obovate, rounded or elliptic, 2.5–7 cm long, 1.5–4 cm wide, base cuneate, margin entire, occasionally denticulate near apex, apex rounded or obtuse; large petals sometimes cut toward base. *Stamens* numerous;

filaments similar to or deeper than petals in color, 5–15 mm long, outer ones gradually shorter, at least inner ones dilated to 1.5 mm wide toward base, or all filaments scarcely dilated (var. *calcicola*); dilated part of filaments usually overlapping and tightly or loosely surrounding ovary; anthers oblong, 1.2–2.5 mm long, thecae dull orange, dull yellow or blackish purple. *Ovary* ellipsoid, 5–11 mm long, densely or sparsely bristly; style 2–4 mm long in flower, to 7 mm long in fruit; stigma clavate, 3–8 mm long, 3–7 lobed; lobes linear-oblong. *Fruiting capsules*, ellipsoid, obovoid or narrowly ellipsoid, 12–19 mm long, 5.5–12 mm across, bristly or occasionally glabrous, sometimes somewhat warty.

**Distribution:** China, S Gansu and N Sichuan, 3,400–4,150 m.

*J. F. Rock* 12613 was treated as *Meconopsis sinomaculata* by Grey-Wilson (2014). *J. F. Rock* 12613 is, however, considered to be typical *M. psilonomma*. It was collected at the type locality of *M. psilonomma* and is selected here as the epitype of *M. psilonomma* to complement the inferior type specimen already mentioned.

In his monograph, Grey-Wilson (2014: 308–312; photographs on pages 308–312) included plants on a hill near Huanglong (黄龙), northern Sichuan, in *M. psilonomma*. However, the flowers of the Huanglong plant are lateral facing and open flat in fine weather; the filaments are erect and tightly surround the ovary and the style; the outer filaments are similar to or a little shorter than the others at anthesis; the pistil is similar to or slightly longer than the stamens, which are much shorter than the petals, so



that the stigma is usually surrounded by the compact mass of anthers at the center of widely opened flowers. The flowers of *M. psilonomma* are usually cup shaped and lateral facing or half nodding even in fine weather; the outer filaments are gradually shorter; the pistil is longer than the stamens so that the stigma protrudes beyond the loose mass of anthers at anthesis. The Huanglong plants can be distinguished from *M. psilonomma* by these features.

Grey-Wilson (2014) compared the stamens of *Meconopsis psilonomma* with those of *M. henrici* in his monograph, p.311, as follows: in *M. henrici* all the

filaments are dilated in the lower half forming a distinct muff around the base of the ovary, while in *M. psilonomma* the filaments are less markedly dilated and affect only the outer stamens. In *M. henrici*, all the filaments are dilated in the lower half and form a distinct muff around the ovary, as he mentioned, but not only around the base of the ovary but, at least the innermost ones, around most of the ovary. In *M. psilonomma*, the outermost filaments are gradually shorter and sometimes hardly dilated, but the inner filaments are dilated and tightly surround most of ovary except in *M. psilonomma* var. *calcicola*.

#### KEY TO THE VARIETIES OF *MECONOPSIS PSILONOMMA*

- 1a. Petals pale purple or lavender purple, without prominent blotch at base; thecae dull orange ..... var. *psilonomma*
- 1b. Petals purple or deep purple, with prominent dark purple blotch at base; thecae blackish purple, dull orange or dull yellow ..... 2
- 2a. Thecae and style blackish purple ..... var. *sinomaculata*
- 2b. Thecae dull orange or dull yellow; style pale green, sometimes tinged with purple ..... 3
- 3a. Plants 30-55 cm tall in flower; flowers cup shaped; filaments slightly dilated toward base and tightly or loosely surrounding ovary ..... var. *zhaganaensis*
- 3b. Plants 15-30 cm tall in flower; flowers shallowly cup shaped; filaments scarcely dilated or slightly dilated toward base, radiating or loosely surrounding ovary ..... var. *calcicola*

***Meconopsis psilonomma* var. *psilonomma*.** (Fig. 5–6, 17–21).

Basionym: *Meconopsis henrici* Bur. & Franch. var. *psilonomma* (Farrer) Taylor, The Genus *Meconopsis* 81. 1934.

Usage synonym: *Meconopsis psilonomma* sensu Grey-Wilson, pro parte, The Genus *Meconopsis* – Blue Poppies and their relatives: 308 (2014).

*Plants*, when in flower, 15–40 cm tall, when in fruit, to 50 cm tall in fruit. *Scapes* 2.5–6 mm across when fresh, 2–5 mm across when dried. *Flowers* mostly cup shaped, lateral facing or half nodding, occasionally dish shaped and lateral facing or upright in small plants. *Petals* pale purple or lavender purple, gradually deeper colored and bluish near base, 3–4.5 cm long. *Filaments* dilated to 1.5 mm wide toward base, outermost filaments often scarcely dilated; dilated part of filaments, at least in inner ones, tightly surrounding ovary; thecae dull orange. *Style* pale green, 2–3 mm long in flower, to 5.5 mm long in fruit. *Fruiting capsules* ellipsoid or obovoid, 12–15 mm long, 8–11 mm across.

**Distribution and habitat:** China, S Gansu, Zhuoni Xian and Diebu Xian, eastern Die Shan, head of Dayugou valley, 3,500–3,800 m; on northwest-facing, rarely northeast-facing, partly moss-covered grassy alpine slopes near gentle grassy ridges of limestone mountains; scattered with dwarf shrubs such as *Rhododendron* and *Salix*; occasionally close to dwarf shrubs with scapes protruding through the intricate branches of the shrubs; rooting in gravelly humus.

**Additional specimens examined:** CHINA. S Gansu: Donsari Khikha at the head of Dayugou, Gansu Min Shan, Diebu Xian, 34°18'12"N, 103°26'21"E, alt. 3,750 m, July 24, 2016, *T. Yoshida K109* (KUN, TI).

***Meconopsis psilonomma* var. *sinomaculata*** (Grey-Wilson) H. Ohba, J. Jap. Bot. 81(5): 296. 2006.

Basionym: *Meconopsis sinomaculata* Grey-Wilson, Plantsman, n. s., 1 (4): 221. 2002. TYPE: CHINA. N Sichuan, top of Gonggaling (Gonggan Len) between Jiuzhaigou Xian and Songpan Xian, 33°00'46"N, 103°42'53"E, 3,400–3,600 m, June 29, 2000, *SBQE 500* (Holotype: E; Isotypes: E, GB, HNWP, WSY). (Fig. 22–26).

*Plants*, when in flower, 28–50 cm tall, when in fruit, to 60 cm tall. *Scapes* 4–7 mm across when fresh, 3–6 mm across when dried. *Flowers* deeply cup shaped, lateral facing or half nodding. *Petals* purple or deep purple with prominent dark purple blotch at base, 4–7 cm long. *Filaments* dilated to 1.5 mm wide toward base, at least in inner ones tightly surrounding ovary, outermost filaments sometimes scarcely dilated; thecae blackish purple. *Ovary* tinged blackish purple around apex; style blackish purple, 2–4 mm long in flower, to 7 mm long in fruit. *Fruiting capsules*, ellipsoid, 12–17 mm long, 8–12 mm across.

**Distribution and habitat:** China, N Sichuan: Songpan Xian and Jiuzhaigou Xian, around Gonggaling, 3,400–3,750 m; south- and southwest-facing slopes with herbs and grasses and scattered shrubs of *Spiraea*, *Sibiraea* Maxim., *Potentilla*, *Salix* and *Rhododendron*; scapes occasionally protruding through branches of dwarf shrubs; rooting in gravelly humus.

*Meconopsis psilonomma* var. *sinomaculata* is the largest variety in stature and size of the flowers. The flowers sometimes appear to have a large dark purple eye in the center because the immature anthers, styles, upper ovaries, and base of petals are all dark purple.

Grey-Wilson (2014) included *J. F. Rock 12613*, collected in the eastern part of Die Shan, S Gansu, in *M. sinomaculata* Grey-Wilson. However, this specimen proves to be a typical





FIGURE 17. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.





FIGURE 18. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in T. Yoshida K109.





FIGURE 19. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.





FIGURE 20. *Meconopsis psilonomma* Farrer var. *psilonomma*, a flower with petals removed to show anthers and stigma. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.





FIGURE 21. Dried fruits of *Meconopsis psilonomma* Farrer var. *psilonomma*. Photograph by T. Yoshida, based on T. Yoshida K 109.

plant of *M. psilonomma* var. *psilonomma* as previously mentioned. Grey-Wilson (2014) included SE Qinghai in the distribution of *M. sinomaculata*, but the plants in SE Qinghai resembling his *M. sinomaculata* appear to be another species that has unique scale-like hairs densely covering the ovary.

**Additional specimens examined:** CHINA. N Sichuan: on the western side of Gonggaling pass, Songpan Xian, 33°02'58"N, 103°41'42"E, 3,700 m, July 9, 2017, T. Yoshida K116 (KUN, TI).

***Meconopsis psilonomma* var. *zhaganaensis*** T. Yoshida & H. Sun, var. nov. TYPE: CHINA. S Gansu, Diebu Xian, W of Zhagana, 34°15'27"N, 103°06'10"E, 3,700 m, July 23, 2014, T. Yoshida K96 (Holotype: KUN; Isotype: TI). (Fig. 7–8).

The proposed variety differs from variety *psilonomma* and variety *sinomaculata* in the narrowly ellipsoid fruit capsules to 7 mm across; it differs from var. *calicicola* in its taller stature and cup-shaped flowers.

*Plants*, when in flower, 30–55 cm tall in flower, when in fruit, to 60 cm tall in fruit. *Scapes* 2.5–5.5 mm across when fresh, 1.5–4.5 mm across when dried. *Flowers* cup shaped, lateral facing or half nodding. *Petals* purple with prominent dark purple blotch at base, 2.5–5 cm long. *Filaments* slightly dilated to 0.7 mm wide toward base, outermost filaments

sometimes scarcely dilated; tightly or loosely surrounding ovary; thecae dull orange or dull yellow. *Style* pale green sometimes tinged with purple, 1.5–3 mm long in flower, 2–4 mm long in fruit. *Fruiting capsules* narrowly ellipsoid, 14–19 mm long, 5.5–7 mm across.

**Distribution and habitat:** China, S Gansu, Diebu Xian, western Die Shan, 3,500–3,800 m elevation; usually among herbs and dwarf shrubs of *Potentilla* near the crest of southwest-facing, half shaded, partly moss-covered steep banks; rooting in wet humus covering rocks.

***Meconopsis psilonomma* var. *calicicola*** T. Yoshida & H. Sun, var. nov. TYPE: CHINA. S Gansu, Diebu Xian, W of Zhagana, 34°16'14"N, 103°03'57"E, 4,050 m, July 24, 2014, T. Yoshida K97 (Holotype, KUN; Isotype, TI). (Fig. 9–11).

*Meconopsis psilonomma* var. *calicicola* differs from the other varieties in the shallowly cup-shaped flowers and from var. *psilonomma* in the petals with a prominent dark purple blotch at the base. It differs from var. *sinomaculata* in the dull orange thecae, and from var. *zhaganaensis* in its low stature.

*Plants*, when in flower, 15–30 cm tall, when in fruit, to 40 cm tall. *Scapes* 2–3.5 mm across when fresh, 1.5–2.3 mm across when dried. *Flowers* shallowly cup shaped, occasionally dish shaped, lateral facing or half nodding, rarely upright in small plants. *Petals* purple with prominent dark purple blotch at base, 3.2–4.2 cm long. *Filaments*





FIGURE 22. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.





FIGURE 23. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba, flower opened by hand to show inside. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.





FIGURE 24. Fresh specimens of *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.





FIGURE 25. Fresh specimens of *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in T. Yoshida K116.

scarcely dilated, or slightly dilated to 0.7 mm wide toward base, radiating or loosely surrounding ovary; thecae dull orange. *Style* pale green, sometimes tinged with purple, 1.5–3 mm long in flower. *Fruit* not seen.

**Distribution and habitat:** China, S Gansu, Diebu Xian, western Die Shan, 4,000–4,150 m; on west- and southwest-facing rocky limestone slopes, often beside

rocks, occasionally on rock ledges, exposed to strong sun and wind, near the crest of the main ridge of westernmost Die Shan; rooting in shallow soil on rocks with other herbs, grasses and mosses.

*Meconopsis psilonomma* var. *calcicola* flowers in late July and probably until early August when most plants of other varieties have already finished flowering.

#### LITERATURE CITED

- OHBA, H., S. AKIYAMA, AND S.-K. WU. 2006. Recent collections of the Sion-Himalayan *Mecanopsis* (Papaveraceae). *Journal of Japanese Botany* 81 (5): 289–297.
- FARRER, R. [27 February] 1915. Mr. Reginald Farrer's exploration in China. *The Gardeners' Chronicle* ser. 3, 57: 109–110.
- . 1919. *The English Rock-Garden*. Volume II. T. C. & E. C. Jack, Ltd., London.
- . 1926. *On the Eaves of the World*. Volumes 1–2. Edward Arnold & Co., London.
- GREY-WILSON, C. 2002. A New Blue poppy from Western China, *The Plantsman*, n. s. 1(4): 221–227.
- . 2014. *The Genus Meconopsis—Blue poppies and their relatives*. Kew Publishing, Royal Botanic Gardens, Kew, Richmond.
- PRIN D. 1915. Some additional species of *Meconopsis*. *Bulletin of miscellaneous information* No. 4: 129–177.
- ROCK, J. F. 2010. *Phytogeography of Northwest and Southwest China*. H. WALRAVENS, ED. Österreichische Akademie der Wissenschaften, Vienna.
- . 2012. *Diaries of Joseph F. Rock* (Archives III JFR). Transcribed by M. Harrison. Arnold Arboretum of Harvard University, [https://arboretu m.harvard.edu/wp-content/uploads/III\\_JFR\\_2012.pdf](https://arboretu m.harvard.edu/wp-content/uploads/III_JFR_2012.pdf)
- TAYLOR, G. 1934. *An Account of the Genus Meconopsis*. New Flora and Silva Ltd., London.
- ZHANG, M. L., AND C. GREY-WILSON. 2008. *Meconopsis*. *Flora of China* 7: 262–278.





FIGURE 26. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba, erect fruit. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.



## APPENDIX

Because of his pioneering work in exploring Gansu Min Shan, Farrer's map in his book (1926) is not precise in its topography, and the romanization of place names in the map and in the text often differ from their modern names and transliterations. Farrer's map is reprinted below (Fig. 27) with the type localities of *Meconopsis lepida* (A)

and *M. psilonomma* (C) marked. It is accompanied by a comparison table (Table. 2) giving place names on the map and their modern Chinese names. The table includes some additional place names used in Farrer's book (1926) and those used by Rock.

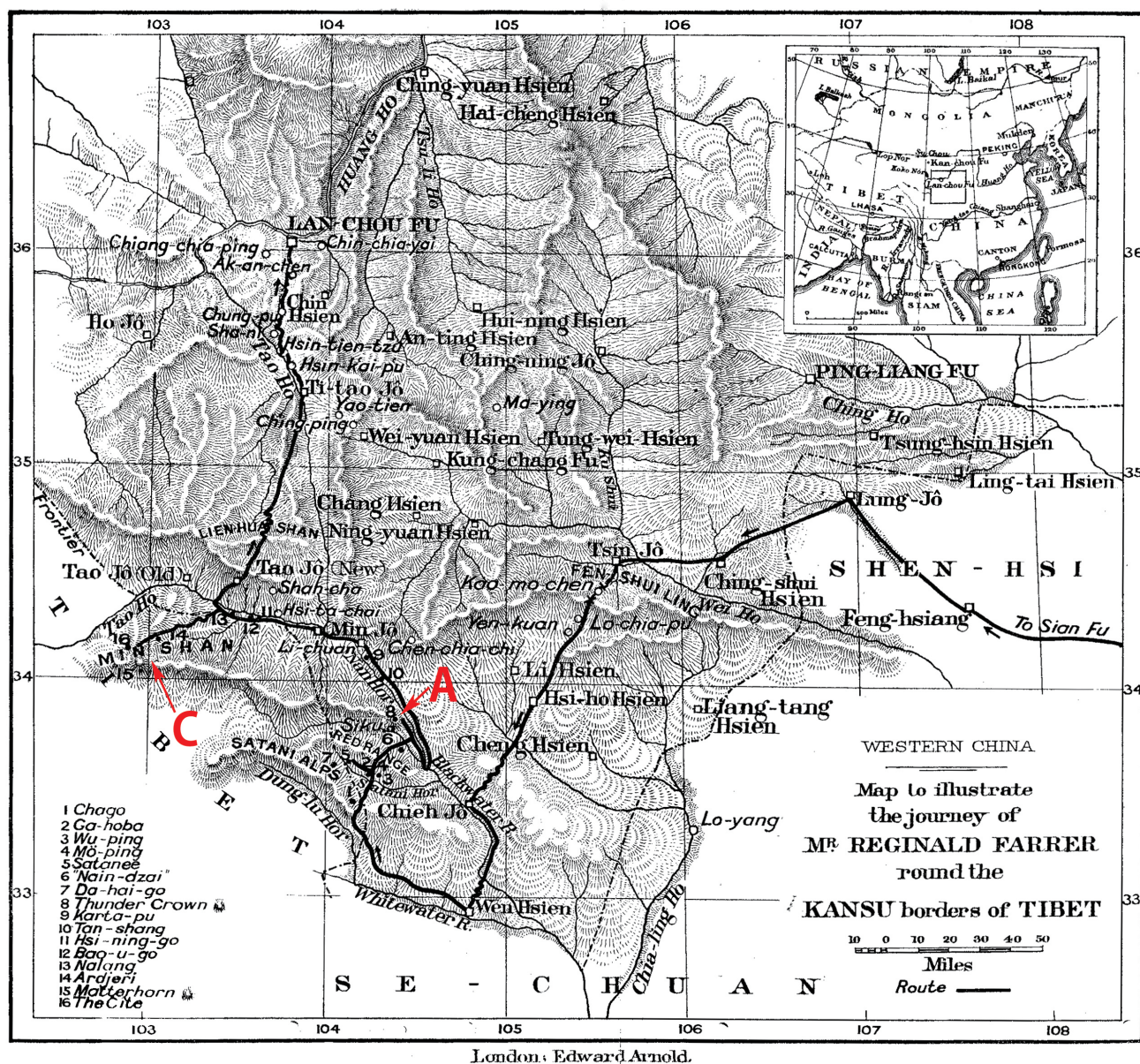


FIGURE 27. Map from Farrer (1926: at the end of volume 1). A, type locality of *Meconopsis lepida* Prain; C, type locality of *M. psilonomma* Farrer, both marked in red.

TABLE. 2. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S MAP		MODERN CHINESE NAMES	
N32-33, E104-105	Whitewater R.	白水江	Baishui Jiang
N32-33, E104-105	Wen Hsien	文县	Wen Xian
N32-33, E105-106	SE-CHUAN	四川	Sichuan
N32-33, E105-106	Chia-ling Ho	嘉陵河	Jialing He
N33-34, E103-104	Dung-lu Hor	中路河	Zhonglu He
N33-34, E104-105	3 Wu-ping	武坪	Wuping
N33-34, E104-105	5 Satanee	沙滩	Shatan
N33-34, E104-105	6 Nain dzai	南峪	Nan-yu
N33-34, E104-105	7 Da-hai-go	大海沟	Dahaigou
N33-34, E104-105	8 Thunder Crown	雷古山	Leigu Shan
N33-34, E104-105	Satani Hor	拱坝河	Gongba He
N33-34, E104-105	Siku (西固 Xigu)	舟曲	Zhouqu
N33-34, E104-105	Chieh Jô	武都	Wudou
N33-34, E104-105	Blackwater R.	白龙江	Bailong Jiang
N33-34, E105-106	Hsi-ho Hsien	西和县	Xihe Xian
N33-34, E105-106	Cheng Hsien	成县	Cheng Xian
N33-34, E106-107	Lo-yang	洛阳	Loyang
N33-34, E106-107	Liang-tang Hsien	两当县	Liangdang Xian
N34-35, E102-103	Tao Ho	洮河	Tao He
N34-35, E103-104	MIN SHAN (岷山)	迭山	Die Shan
N34-35, E103-104	12 Bao-u-go	博峪沟	Boyugou
N34-35, E103-104	13 Nalang	纳浪	Nalang
N34-35, E103-104	14 Ardjeri*	阿角	Ajiao
N34-35, E103-104	Tao Jô (OLd)	卓尼	Zhuoni
N34-35, E103-104	Tao Jô (New)	新城	Xinchuang
N34-35, E103-104	LIEN-HUA SHAN	莲花山	Lianhua Shan
N34-35, E103-104	Min Jô	岷县	Min Xian
N34-35, E103-104	Hsi-ta-chai	西寨 ?	Xizhai ?
N34-35, E104-105	Li-chuan	理川	Lichuan
N34-35, E104-105	Nan Hor	岷江	Min Jiang
N34-35, E104-105	9 Karta-pu	哈达铺	Hadapu
N34-35, E104-105	10 Tan-shang	宕昌	Dangchang
N34-35, E104-105	Chang Hsien	漳县	Zhang Xian
*Approaching route to 14 Ardjeri should be drawn more easterly, diverging from 12 Bao-u-go toward south, according to the text of the book Vol.II (p.138-191).			



TABLE. 2 CONT. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S MAP		MODERN CHINESE NAMES	
N34-35, E105-106	Li Hsien	礼县	Li Xian
N34-35, E105-106	Tsin Jô	天水	Tianshui
N34-35, E105-106	Ku Shui	苦水	Kushui
N34-35, E106-107	Wei Ho	渭河	Wei He
N34-35, E106-107	Ching-Shui	清水	Qingshui
N34-35, E106-107	Lung-Jô	陇县	Long Xian
N34-35, E107-108	Feng-hsiang	凤县	Feng Xian
N34-35, E107-108	SHEN-HSI	陕西	Shanxi
N34-35, E108-109	Sian Fu	西安	Xian
N35-36, E102-103	Ho Jô	临夏 ?	Linxia ?
N35-36, E103-104	Tao Ho	洮河	Tao He
N35-36, E103-104	Ti-tao Jô	临洮县	Lintao Xian
N35-36, E103-104	Hsin-tien-tzu	新添	Xintian
N35-36, E103-104	Chung-pu	中铺	Zhongpu
N35-36, E103-104	Ak-an-chen	阿干	Agan
N35-36, E104-105	Yao-tien	窑店	Yaodian
N35-36, E104-105	Ching-ping	庆坪	Qingping
N35-36, E104-105	Wei-yuan Hsien	渭源县	Weiyuan Xian
N35-36, E104-105	Nian-yuan Hsien	武山县 ?	Wushan Xian ?
N35-36, E104-105	An-ting Hsien	安定县	Anding Xian
N35-36, E104-105	Kung-chang (巩昌) Fu	陇西县	Longxi Xian
N35-36, E104-105	Hui-ning Hsien	会宁县	Huining Xian
N35-36, E104-105	Ma-ying	马营	Maying
N35-36, E105-106	Tung-wei Hsien	通渭县	Tongwei Xian
N35-36, E105-106	Ching-ning Jô	静宁	Jingning
N35-36, E106-107	PING-LIANG FU	平凉	Pingliang
N35-36, E107-108	Ching Ho	泾河	Jing He
N35-36, E107-108	Tsung-hsin Hsien	崇信县	Chongxin Xian
N35-36, E107-108	Ling-tai Hsien	灵台县	Lingtai Xian
N36-37, E103-104	LAN CHOU FU	兰州	Lanzhou
N36-37, E104-105	HUANG HO	黄河	Huang He
N36-37, E104-105	Ching-yuan Hsien	靖远县	Jingyuan Xian
N36-37, E104-105	Tsu-li Ho	祖厉河	Zuli He
N36-37, E105-106	Hai-cheng Hsien	海城	Haicheng

TABLE. 2 CONT. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S BOOK, VOL.II		MODERN CHINESE NAMES	
p.125	Mirgo Valley	木耳沟	Muergou
p.152	Main valley	小沟	Xiaogou
p.152	Wildest of all the ravines	大沟	Dagou
NAMES IN THE ROCK'S BOOK		MODERN CHINESE NAMES	
p.25	Kan-su	甘肃	Gansu
p.25	Ch'ing-hai	青海	Qinghai
p.25	Ssu-ch'uan	四川	Sichuan
p.25	Szechuan	四川	Sichuan
p.25	Min Shan	甘肃岷山	Gansu Minshan
p.25	Lien-hua Shan	莲花山	Lianhua Shan
p.27	His-ku (西固 Xigu)	舟曲	Zhouqu
p.27	Shih-men	石门	Shimen
p.28	Pai-lung Chiang	白龙江	Bailong Jiang
p.28	T'ao River	洮河	Tao He
p.29	Ch'e-pa kou	车巴沟	Chebago
p.29	Kuang-k'e La	光克拉	Guangke La
p.29	Cho-ni	卓尼	Zhuoni
p.29	K'a-cha kou	卡车沟	Kachegou
p.29	Ma-erh kou	木耳沟	Muergou
p.29	Po-yü kou	博峪沟	Boyugou
p.29	Ta-yü kou	大峪沟	Dayugou
p.29	T'ieh-pu (铁布)	迭部	Diebu
p.29	A-chüan (阿绢)	阿角	Ajiao
p.29	A-chüeh	阿角	Ajiao
p.29	Ta kou	大沟	Dagou
p.29	Hsiao kou	小沟	Xiaogou
p.30	Drag-gam-na	扎尕那	Zhagana
p.30	Yi-wa kou	益哇库	Yiwaku
p.33	The-wu	迭部	Diebu
p.69	Chan-chan-ni	占占	Zhanzhan
p.70	Cha-lieh	扎列	Zhalie
p.70	Ch'i-pu kou	地布沟	Dibugou

## INDEX TO NEW NAMES AND COMBINATIONS

<i>Arabis adpressipilis</i> (M.Hopkins) Al-Shehbaz, <i>comb. et stat. nov.</i> . . . . .	141
<i>Dendrocousinsia elliptica</i> (Sw.) Commock & K.Wurdack, <i>comb. nov.</i> . . . . .	137
<i>Dicliptera francodavilae</i> Cornejo, Wassh. & Bonifaz, <i>sp. nov.</i> . . . . .	121
<i>Euploca calcicola</i> (Fernald) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca cremnogenae</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca fallax</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca foliosissima</i> (J.Fr.Macbr.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca karwinskyi</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca limbata</i> (Benth.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	125
<i>Euploca michoacana</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	126
<i>Euploca queretaroana</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	126
<i>Euploca sessei</i> (I.M.Johnst.) J.I.M.Melo, <i>comb. nov.</i> . . . . .	126
<i>Hilliella sinuata</i> subsp. <i>qianwuensis</i> (Y.H.Zhang) Al-shehbaz & D.A.German, <i>comb. nov.</i> . . . . .	142
<i>Meconopsis psilonomma</i> Farrer var. <i>zhaganaensis</i> T.Yoshida & H.Sun, <i>var. nov.</i> . . . . .	183
<i>Meconopsis psilonomma</i> Farrer var. <i>calcicola</i> T.Yoshida & H.Sun, <i>var. nov.</i> . . . . .	183
<i>Mussaenda reflexisepala</i> T.Chen & V.D.Nong, <i>sp. nov.</i> . . . . .	128
<i>Neocapparis</i> Cornejo, <i>nom. et stat. nov.</i> . . . . .	113
<i>Neocapparis pachaca</i> (Kunth) Cornejo, <i>comb. nov.</i> . . . . .	115
<i>Neocapparis quina</i> (J.F.Macbr.) Cornejo, <i>comb. nov.</i> . . . . .	118
<i>Neuontobotrys amplexicaulis</i> (Kuntze) Al-Shehbaz, <i>comb. nov.</i> . . . . .	143
<i>Stelis alboviolacea</i> Luer, <i>sp. nov.</i> . . . . .	81
<i>Stelis aleanophila</i> Luer, <i>sp. nov.</i> . . . . .	81
<i>Stelis amaliana</i> Luer, <i>sp. nov.</i> . . . . .	112
<i>Stelis amilotensis</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	82
<i>Stelis bialaria</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	82
<i>Stelis blandita</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	82
<i>Stelis chasmiflora</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	84
<i>Stelis chiliantha</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	84
<i>Stelis coccidifera</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	84
<i>Stelis conchipetala</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	86
<i>Stelis culmosa</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	86
<i>Stelis cupidinea</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	88
<i>Stelis dejavu</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	88
<i>Stelis desautelsii</i> Luer, <i>sp. nov.</i> . . . . .	88
<i>Stelis discors</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	89
<i>Stelis diprizo</i> Luer, <i>sp. nov.</i> . . . . .	89



<i>Stelis dissidens</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	89
<i>Stelis elementaria</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	91
<i>Stelis escobarii</i> Luer, <i>sp. nov.</i> . . . . .	112
<i>Stelis fecunda</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	91
<i>Stelis fusilifera</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	92
<i>Stelis gerontica</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	92
<i>Stelis gigapetala</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	92
<i>Stelis hyacinthalis</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	94
<i>Stelis hypsela</i> Luer, <i>sp. nov.</i> . . . . .	94
<i>Stelis jorgei</i> Luer, <i>sp. nov.</i> . . . . .	94
<i>Stelis luisii</i> Luer, <i>sp. nov.</i> . . . . .	96
<i>Stelis meerenbergensis</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	96
<i>Stelis niessen-andreae</i> Luer, <i>sp. nov.</i> . . . . .	96
<i>Stelis octavioi</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	98
<i>Stelis odontopetala</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	98
<i>Stelis orphana</i> Luer, <i>sp. nov.</i> . . . . .	100
<i>Stelis oscarii</i> Luer, <i>sp. nov.</i> . . . . .	112
<i>Stelis pasminoi</i> Luer, <i>sp. nov.</i> . . . . .	100
<i>Stelis posadarum</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	100
<i>Stelis praecipua</i> Luer, <i>sp. nov.</i> . . . . .	101
<i>Stelis quintella</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	101
<i>Stelis remulifera</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	101
<i>Stelis ricaurtensis</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	104
<i>Stelis riseraldae</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	104
<i>Stelis saurota</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	104
<i>Stelis scalaris</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	104
<i>Stelis secundosa</i> Luer, <i>sp. nov.</i> . . . . .	104
<i>Stelis sobrina</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	107
<i>Stelis splendens</i> Luer, <i>sp. nov.</i> . . . . .	107
<i>Stelis stigmatica</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	107
<i>Stelis stolonifera</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	108
<i>Stelis uncinula</i> Luer & Hirtz, <i>sp. nov.</i> . . . . .	108
<i>Stelis vanescens</i> Luer, <i>sp. nov.</i> . . . . .	108
<i>Stelis variola</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	110
<i>Stelis verruculosa</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	110
<i>Stelis vigoris</i> Luer & R.Escobar, <i>sp. nov.</i> . . . . .	112
<i>Stelis zelleri</i> Luer, <i>sp. nov.</i> . . . . .	112
<i>Zygostates luerorum</i> Toscano & R.Vasquez, <i>sp. nov.</i> . . . . .	133

---

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# Harvard Papers in Botany

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A Publication of the Harvard University Herbaria Including  
The Journal of the Arnold Arboretum

**Gerardo A. Aymard C.**

Lectotypifications and nomenclatural notes of José Jerónimo Triana's species of Dilleniaceae 77

**Carlyle A. Luer**

*Icones Stelidarum (Orchidaceae) Colombiae IV* 81

**Xavier Cornejo**

*Neocapparis*: generic status and new name for *Capparidastrum* subgenus *Pachycarpum* (Capparaceae) 113

**Xavier Cornejo, Dieter Wasshausen, and Carmen Bonifaz**

*Dicliptera francodavilae* (Acanthaceae): A new species from the coastal dry forests of the province of Guayas, Ecuador 121

**José Iranildo Miranda de Melo**

New combinations in *Euploca* Nutt. (Heliotropiaceae) from Mexico and Central America 125

**Van Duy Nong and Tao Chen**

*Mussaenda reflexisepala*, a new species of Rubiaceae from Vietnam 127

**A. L. V. Toscano de Brito**

*Zygostates luerorum*—A new species from Bolivia in the *Ornithocephalus* clade of subtribe Oncidiinae (Orchidaceae) 133

**Tracy Commock, Philip E. Rose, Kanchi N. Gandhi, Keron C. St. E. Campbell, Kenneth J. Wurdack, Javier Francisco-Ortega, and Brett Jestrow**

Typification and nomenclature of five taxa endemic to Jamaica 137

**Ihsan A. Al-Shehbaz**

Nomenclatural adjustments in North American *Arabis*, Chinese *Hilliella*, and South American *Neuontobotrys* (Brassicaceae) 141

**Gustavo A. Romero-González, Germán Carnevali, Ramón E. López, and Simeón C. Pérez**

*Catasetum ×dunstervillei* (Orchidaceae: Catasetinae), a natural hybrid confirmed by artificial hybridization 145

**Toshio Yoshida and Hang Sun**

*Meconopsis Lepida* and *M. Psilonomma* (Papaveraceae) Rediscovered and Revised 157

Index to New Names and Combinations 193

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# Harvard Papers in Botany

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Volume 22, Number 2

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