

NOVELTIES IN THE ORCHID FLORA OF VENEZUELA IX. SUBTRIBE ZYGOPETALINAE. *KOELLENSTEINIA LILIJAE*

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Abstract. We present additional information on and illustrations of *Koellensteinia lilijae*, a species previously known only from the holotype. A new historical report of *Warreopsis colorata* from northern Venezuela is presented in an appendix.

Resumen. Se presenta información e ilustraciones adicionales de *Koellensteinia lilijae*, una especie que previamente sólo se conocía del holotipo. Se presenta en un apéndice un nuevo reporte histórico de *Warreopsis colorata* del norte de Venezuela.

Keywords: *Koellensteinia lilijae*, Orchidaceae, Venezuela, Zygopetalinae

Koellensteinia Rchb.f. (Orchidaceae) is a Neotropical genus currently encompassing 14 species found from Belize, and Panama (but so far not found in between these two countries) to Brazil and Bolivia, mostly in Brazil (10 species) and Venezuela (6 species), one of which is presented herein.

Koellensteinia Rchb.f. Bonplandia (Hannover) 2, 2: 17. 1854.

Type Species: *Koellensteinia kellneriana* Rchb.f.

Eponymy: named after Kellner von Köllenstein, an Austrian Captain of the 19th century.

Pollination: Unknown, but presumably by euglossine bees.

Koellensteinia lilijae Foldats. Boletín de la Sociedad Venezolana de Ciencias Naturales 22: 100. 1961. TYPE: VENEZUELA. Amazonas: Departamento Atabapo, Laja Cabezón, en las orillas del río Cabezón, cerca de su desembocadura en el río [Atacavi], [11 September 1960] *E. Foldats 3899* (Holotype: VEN [48828]; Holotype fragment: AMES). Fig. 1–3.

“Río Cabezón” is not a tributary of the Atabapo river, as stated in the protologue, but, rather, of the Atacavi river (their confluence at ca. 03°07'33"N, 67°17'18"W); the latter is a tributary of the Atabapo, itself one of the Orinoco river.

Here we transcribe the description provided by the author in the protologue, verbatim (Foldats, 1961), as well as an

English translation; additional information, from the present authors, is included in brackets.

Hierba terrestre, [de] unos 80 cm [de] alto. *Rizoma* abreviado. *Pseudobulbos* agregados, elipsoides, cuando jóvenes vestidos con varias vainas escariosas, dísticas, imbricadas, agudas, que se desintegran con la edad, cuando viejos desnudos, unos 2.5 cm [de] largo y 7 mm [de] ancho, continuándose en una porción delgada, talliforme, terete, longitudinalmente surcada, unos 30 cm [de] largo y 6 mm [de] espesor [en el ápice de la cual se encuentra la zona de abscisión de la hoja], unifoliados. *Hojas* [articuladas, glaucas, adaxialmente verde-azuladas, abaxialmente verde oscuras] lanceoladas, agudas o acuminadas, atenuadas en la base en un pecíolo; limbos hasta aproximadamente 40 cm [de] largo y 6 cm [de] ancho, con 3 ó 5 nervios más pronunciados; *pecíolo* acanalado, hasta aproximadamente 7 cm [de] largo. *Inflorescencia* racimo subdensamente plurifloro, unos 55 cm [de] largo, erecto; *pedúnculo* [púrpura] vestido con varias vainas aplicadas, las basales aproximadas, las superiores distanciadas, unos 1.52 cm [de] largo [raquis verde]. *Flores* [resupinadas], erecto-patentes, cuando aplanadas unos 27 mm [de] diámetro, amarillas con los segmentos del perianto, especialmente los pétalos y labelo con puntos o cortas rayitas purpúreas [labelo blanco crema en flores recién abiertas, tornándose amarillo con el tiempo, el lóbulo central con líneas transversales anchas y cortas, púrpura, los lóbulos laterales con líneas longitudinales del mismo color, angostas; sépalos y pétalos

We thank the staff and curators of BR, K, P, TFAV, VEN, and W for allowing access to their collections, Bobbi Angell for her illustration, to K. Gandhi for his help with nomenclatural matters, to the community of Tabucal, along the lower Atacavi river, for their help in the field and for their overall field expertise, and especially R. González, O. Florenzano, and F. Molina for their assistance in locating particular geographical sites in Amazonas state. The American Orchid Society provided copies of the G.C.K. Dunsterville's drawings under their care, and the Orchid Society of Arizona provided generous financial support (to GAR-G).

¹ Previous articles in this series were Romero-González and Batista (2009), Romero-González et al. (2010a), Romero-González et al. (2010b), Romero-González and Meneguzzo (2012), Romero-González et al. (2013a), Romero-González et al. (2013b), Romero-González and Gómez (2014), and Romero-González et al. (2015).

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⁵ Calle Urdaneta No. 36, Puerto Ayacucho, Amazonas, Venezuela 7101. Carlos A. Gómez-Dahuema (1943–2016), was my faithful field companion for many years (1989–2013). Carlos unfortunately died of a bout of malaria, this time caused by a *Plasmodium falciparum* Welch (Plasmodiidae). A drug treatment exists to treat this deadly parasite, but unfortunately it was not available in the hospital of his home town when he needed it (GAR-G).

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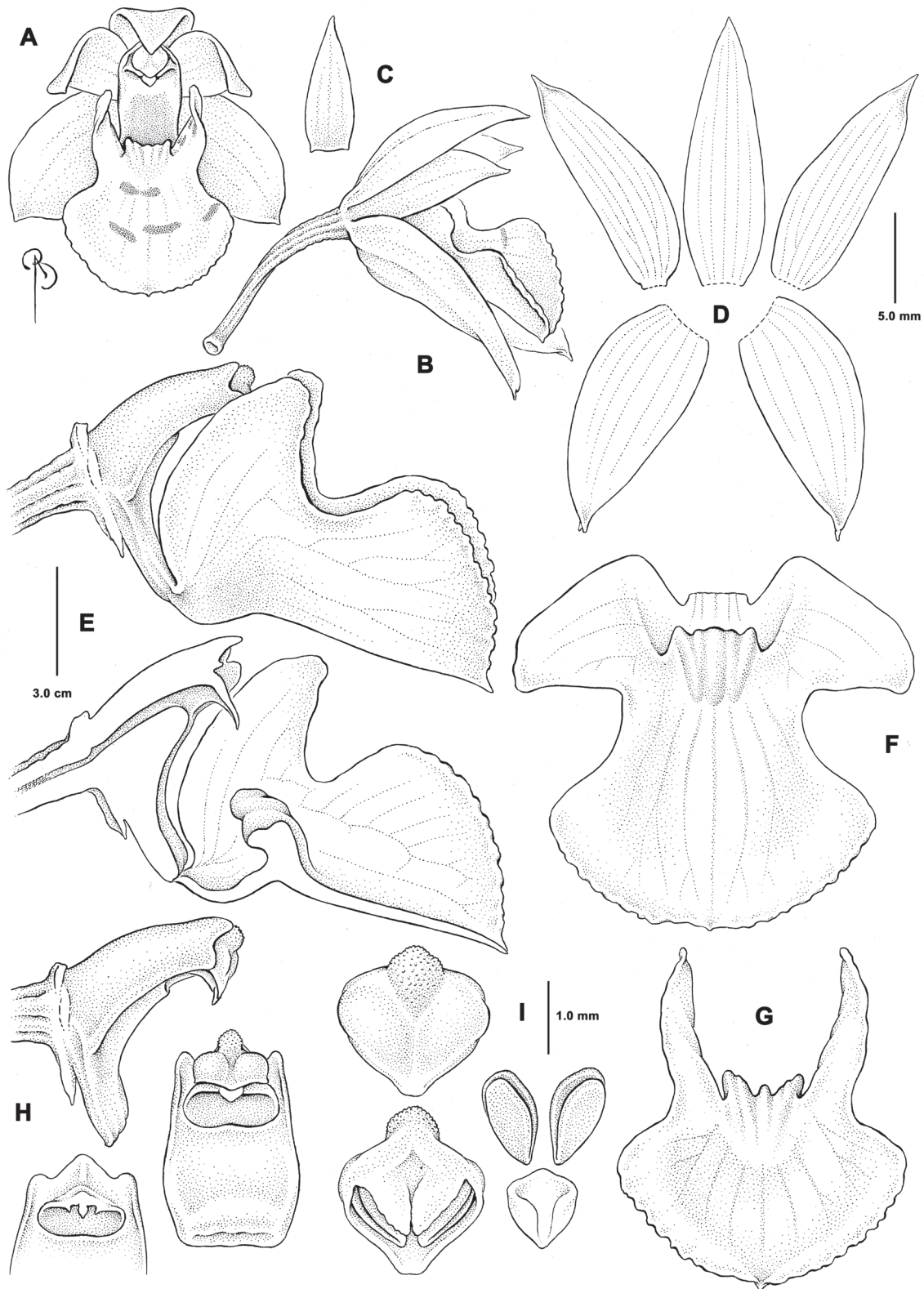


FIGURE 1. *Koellensteinia lilijae* Foldats. **A**, Front view of flower; **B**, side view of flower; **C**, floral bract; **D**, sepals and petals; **E**, side view of column and labellum, entire and longitudinally sectioned; **F**, above view of the labellum; **G**, front view of the labellum; **H**, different views of the column. **I**, views of the anther and the pollinarium. Drawing by B. Angell based on G. A. Romero, C. Gómez & G. Gerlach 3588 (AMES).

verde claro en flores recién abiertas, tornándose amarillo verdosos con el tiempo]. *Ovario* pedicelado [verde oscuro] unos 8 mm [de] largo. *Brácteas* aovadas o triangular-aovadas, agudas, 4–8 mm [de] largo y 3–4.5 mm [de] ancho. *Sépalos* carnosos, elípticos o aovado-elíptico, agudos o apiculados, unos 14–15 mm [de] largo, uninervados; sépalo dorsal unos 7 mm [de] ancho; sépalos laterales oblícuos, unos 8,5 mm [de] ancho. *Pétalos* semejantes a los sépalos, ligeramente oblicuos, unos 14 mm [de] largo y 5.5 mm [de] ancho. *Labelo* carnoso, sésil, moviblemente articulado a la punta del pie de la columna, profundamente trilobulado, ligeramente cordado en la base, unos 8–9 mm [de] largo y cuando aplanado 13–14 mm [de] ancho entre los lobos laterales; lobos laterales erectos, semi-aovados o subelípticos, anchamente redondeados en el ápice; lobo intermedio mayor que los laterales, transversalmente elíptico, en el ápice ligeramente retuso hasta anchamente redondeado, a veces con un apículo mínimo [en flores recién abiertas, lóbulo central subespatulado, anchamente redondeado en el ápice, apiculado]; disco entre los lobos laterales con un callo transversal, compuesto de dos dientes laterales y un lobo medio semi-esférico, retrorso. *Columna* claviforme, incluyendo el pie basal corto unos 6 mm [de] largo. [Antera blanco-amarillenta, transversal y anchamente rómbica, el ápice mínimamente tuberculado, pollínios amarillos].

Terrestrial *herbs*, some 80 cm in height. *Rhizome* abbreviate. Pseudobulbs aggregate, ellipsoid, when young covered with scarios, distichous, imbricate, acute sheaths, which disintegrate with time, naked when old, ca. 2.5 cm high and 7 mm wide, with a thin, tubular, terete, stem-like, longitudinally grooved extension [at the apex of which is the leaf abscission layer], unifoliate. *Leaves* [articulate, glaucous, adaxially bluish-green, abaxially dark green] lanceolate, acute or acuminate, basally attenuate to a petiole; lamina to ca. 40 cm long and 6 cm wide, with 3 or 5 pronounced nerves; petiole grooved, to 7 cm long. *Inflorescence* a a subsense, pluriflorous raceme, erect, ca. 50 cm long; peduncle [purple] with several tubular, sheathing bracts, the basal ones clustered, the upper ones remote, ca. 1.5 cm long [rachis green]. Flowers [resupinate], erect-patent, when flattened ca. 27 mm in diameter, yellow with perianth segments, especially the petals and labellum, with purple dots or short lines [labellum creamy white at anthesis, becoming yellowish green with age, the central lobe with short, wide, transversal purple lines, the lateral lobes with thin, longitudinal purple lines; other perianth segments light green at anthesis, becoming greenish yellow with age]. Pedicellate *ovary* [dark green], ca. 8.0 mm long. [Floral] *bracts* ovate to triangular-ovate, acute, 4–8 mm long and 3–4.5 mm wide. *Sepals* fleshy, elliptic to ovate-elliptic, acute [apiculate], ca. 14–15 mm long, uninervate; dorsal sepal ca. 7 mm wide; lateral sepals oblique, ca. 8.5 mm wide. *Petals* similar to the sepals, slightly oblique, ca. 14 mm long and 5.5 mm wide. *Labellum* fleshy, sessile, actively articulate with the apex of the column foot, distinctly trilobate, slightly cordate at the base, ca. 8–9 mm long and, when flattened, 13–14 mm wide between the lateral lobes; lateral lobes erect, semi-ovate or sub-elliptic, broadly rounded at the apex; central lobe larger than the

lateral lobes, transversally elliptic, slightly retuse in the apex to wide rounded, sometimes with a small apiculum [central lobe subspatulate at anthesis, widely rounded at apex, apiculate]; disc between the lateral lobes with a transversal callus, composed of two lateral teeth [keels] and a subspherical, retrorse central lobe. *Column* claviform, ca. 6 mm long including the basal foot. [*Anther* yellowish-white, transverse and widely rhombic, the apex minutely tuberculate. Pollinia yellow].

Eponymy: Named after Lilija Kupfers de Foldats, wife of the author of the species, Ernesto Foldats Andins (1925–2003). She cultivated the sterile, field-collected plants that eventually flowered under her care. See also Hágsater and Santiago (2015).

Iconography: Foldats (1961: Fig. 5; 1970: 253, Fig. 662).

Distribution: Apparently endemic to granite outcrops in the basin of the Atacavi river, but most likely to be found in Colombia in similar habitats.

Field characters: The glaucous leaves, bluish-green on top, dark green below, and the retrorse central lobe on the callus of the labellum.

Other references: Romero-González (2003); Meneguzzo et al. (2015); Ferreira (2015).

Additional specimen examined: VENEZUELA. Amazonas: Municipio Autónomo Maroa, Cerro Mesaque, hierba terrestre, frecuente pero sólo un individuo con flores, hojas verde azuladas, glaucas, verde oscuras en el envés, pedúnculo morado, raquis verde, tépalos verde pálidos, labelo blanco, con manchas moradas, 23 July 2006, G. A. Romero, C. Gómez & G. Gerlach 3588 (AMES [fragment], TFAV, VEN).

This species was never treated in *Venezuelan Orchids Illustrated* (Dunsterville and Garay, 1959–1976), nor in the *Field Guides* (Dunsterville and Garay, 1979; Romero-González and Carnevali Fernandez-Concha, 2000), and no drawing referable to it is to be found among Dunsterville's drawings at AMES or at the American Orchid Society. Foldats and Garay did exchange correspondence regarding this species, archived at the library of the Oakes Ames Orchid Herbarium. Garay received a flower of the type, but he was unable to reconstruct the diagnostic feature: "... *un callo lateralmente bilobado con un lobo central retrorso y semiesférico*" ("a laterally bilobed callus with another central, retrorse and semispherical lobe"; Foldats 1970: 254; Fig. 1A, F–G and Fig. 2D herein) and, in verbal communications with the senior author (GAR-G), he doubted the existence of this species. Garay, in one of his replies to Foldats, dated [Cambridge, Massachusetts, U.S.A.] February 4, 1963, stated the following: "Koellensteinias are devils and I wish they weren't around"!

Koellensteinia lilijae illustrates a common problem in Orchidaceae and other plant families with somewhat "fragile flowers": collectors and growers, who know the plants well, can distinguish several species, whereas "herbarium botanists," who have to rely strictly on what re-hydrated material and herbarium labels can reveal, most often refer otherwise easily distinguishable species to the synonymy of others.

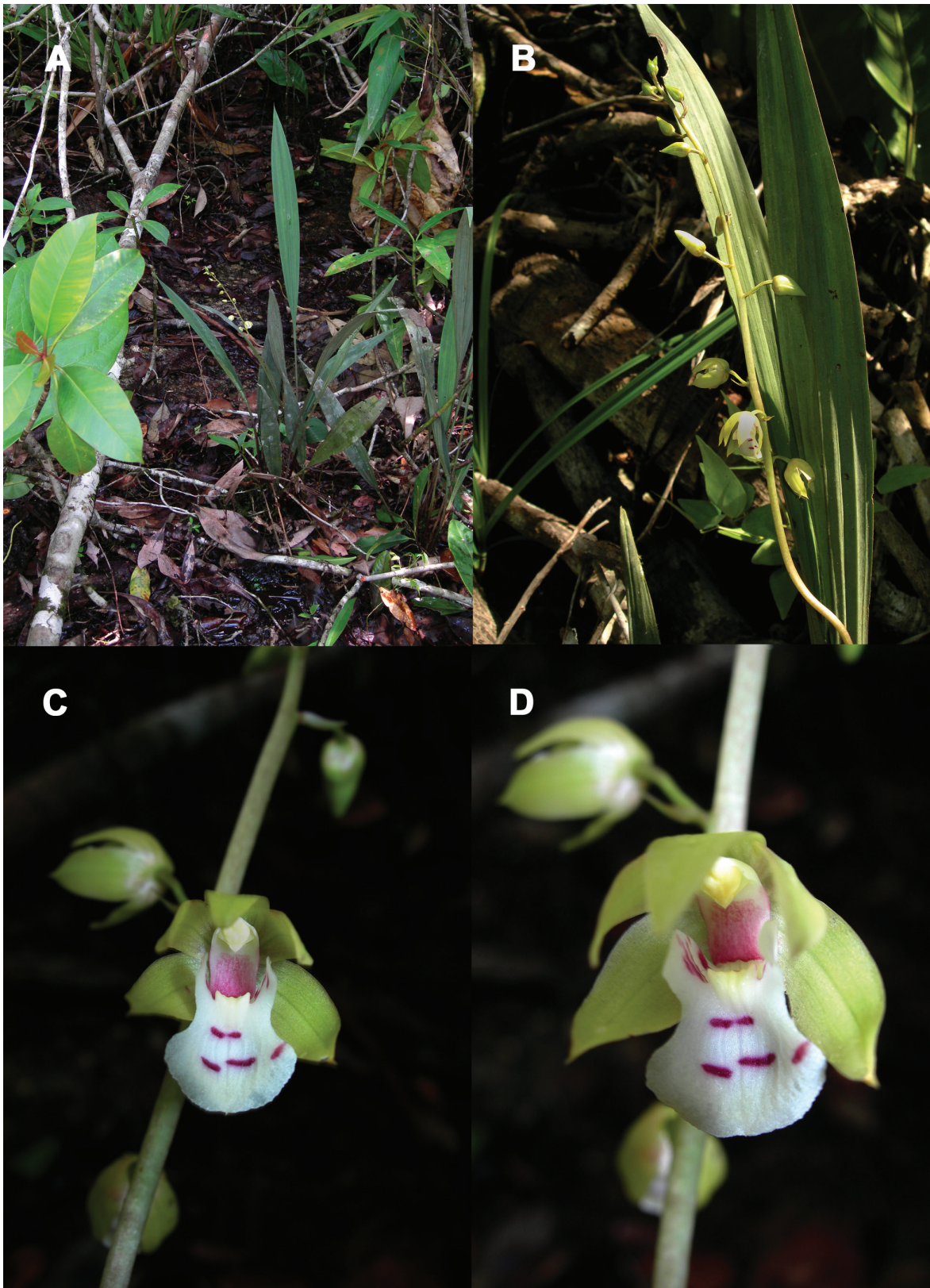


FIGURE 2. *Koellensteinia lilijae* Foldats, plant in the field. **A**, habit; **B**, inflorescence and partial view of leaves; **C**, flower; **D**, close-up of flower. Photographs by G. A. Romero-González based on G. A. Romero, C. Gómez & G. Gerlach 3588 (VEN).



FIGURE 3. *Koellensteinia lilijae* Foldats. Holotype. Courtesy of the Venezuelan Orchid Herbarium (VEN).

While the senior author (GAR-G) lived in southern Venezuela in the 1980s and later during several plant collecting expeditions (1990–2005), looking for this species became a major goal. In retrospect, two of the authors (GAR-G and CAG-D) encountered this species several times, every time without flowers, although always growing on granite, as in the lower slopes of Cerro Sipapo and on granite outcrops north of Tabucal, along the lower Atacavi river, always growing under moderate to heavy shade. Eventually three of the authors (GAR-G, CAG-D, and GG) found it in flower in the lower slopes of Cerro Mesaque, a granite boulder the highest point of which reaches ca. 500 m. It is near the Mesaque river, a tributary of the Atacavi river.

Foldats (1969; 1970: 252), described the color of flowers segments as *flavis*... (from the Latin *flavus*, golden, blonde), suggesting that he examined material already “passed,” or perhaps even “wilting,” where floral segments look “yellowish.” Even in the flowers from the additional collection reported herein, although the background color of the labellum of fresh flowers was brilliant, creamy white, it already presented some yellowish spots (Fig. 2C–D). In addition, the drawing by B. Manara published in the protologue (Foldats, 1961) and later in the orchid treatment

for the *Flora de Venezuela* (Foldats, 1970: 253) was most likely based on herbarium material, where floral parts, particularly the labellum, are shown shrunken longitudinally when compared to the flower *in vivo* (Fig. 1F and Fig. 2C–D versus Fig. 3, emphasizing the labellum shown on the upper margin of the packet).

Number 3899 in Foldats’s collections, cited herein as *Koellensteinia lilijae*, is also cited when referring to *Halimeda incrassata* (J. Ellis) J.V.Lamouroux (Halimedaceae), a macroalga (Ardito and Vera, 1997). Foldats also studied “algae” (see Lasser, 2001 and Vera, 2003). A careful study of Foldats’s field notes and herbarium specimens is needed to sort out this overlap in collection numbers.

It should be emphasized that Foldats collected the species treated here during a trip conducted, as stated in the protologue, in the early 1960s, when he also carried out miscellaneous ecological studies (e.g., see Foldats, 1962), and **not** later in the 1980s, when he participated in one plant collecting expedition to the same general area, this time organized by *Técnica Minera*, C.A. (TECMIN), then a subsidiary of Venezuela’s *Corporación Venezolana de Guayana* (C.V.G.), currently part of *Ministerio del Poder Popular de Desarrollo Minero Ecológico*.

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APPENDIX

Warreopsis colorata (Linden & Rchb.f.) Garay, Orquideología 8, 1: 51. 1973.

Basionym: *Zygopetalum coloratum* Linden & Rchb.f., Ann. Bot. Syst. 6: 662. 1863. TYPE: COLOMBIA. [Norte de Santander: Mesa Rica] “*E Nova Granata iconem misit Schlim*”... (Holotype: J. J. Schlim, Reichenbach Herb. Orchid. 40578, W [45415], drawing on left of sheet).

“...tepalis oblongis apiculatis, sepalis lateralibus obliquis curvatis, labello pandurato apiculato, crista baseos multidentata.

Sepala et tepala extus pallide rufina; intus kermesina maculis luteis. Labellum album seu flavum. Racemus multiflorus. Bractee lanceae dimitiam tertiamve ovarii pedicellali aequantes.”

A specimen collected by August Fendler (1813–1883) under number 1396 (VENEZUELA: Aragua, *Prope Coloniam Tovar*, 1854–5; Lindley Herbarium at K, BR; 255/20 in the microfiche version of the Lindley herbarium; IDC Microforms Publishers, 1987) is not referable to *Koellensteinia* (as “*Källensteinia*” in Lindley, 1861); it is, rather, one, if not the first Venezuelan collection of *Warreopsis colorata*.

The description of the basionym is quoted above, verbatim, from the protologue. The holotype was selected by T. E. C. Meneguzzo in 2012, as indicated in his annotation label placed on the sheet cited above.