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Two new greenish *Encyclia*: *E. parkeri* and *E. silverarum* (Laeliinae, Orchidaceae)

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Abstract

Two new species of *Encyclia* are proposed, *E. silverarum* and *E. parkeri*. Both species belong in the *Encyclia chloroleuca* complex, conformed also by *E. chloroleuca*, *E. elegantula*, and *E. peraltensis,* among others. *Encyclia silverarum* is known only from Panama. This species is very similar to *Encyclia chloroleuca*, but it is distinguished by the color of its sepals and petals (pale green-yellowish brown) and the falcate and proportionally short (<0.60 vs. >0.80 cm long) side lobes of the labellum. *Encyclia parkeri*, known only from Colombia (Department of Valle del Cauca), also is similar to *Encyclia chloroleuca*; however, it is distinguished by its flowers with olive-green to ocher petals and sepals, labellum creamy white, with the central lobe with many keels (at least three), all warty and usually slightly tinged red-purple.

Key words: Colombia, Panama, Valle del Cauca, Dagua, taxonomy, *Encyclia chloroleuca*, *Encyclia amanda*, *Encyclia peraltensis*, *Encyclia thienii*, *Encyclia elegantula*

Resumen

Dos nuevas especies de *Encyclia* son propuestas, *E. silverarum* y *E. parkeri*. Ambas especies pertenecen al complejo *Encyclia chloroleuca*, conformado además por *E. chloroleuca*, *E. elegantula*, *E. peraltensis,* entre otras. *Encyclia silverarum* se conoce sólo de Panamá. Esta especie es muy similar a *Encyclia chloroleuca*, aunque se distingue por el color de sus sépalos y pétalos (verde pálido-café amarillento) y los lóbulos laterales del labelo falcados y proporcionalmente cortos (<0.60 vs. >0.80 cm de largo). *Encyclia parkeri* se conoce sólo de Colombia (Departamento de Valle del Cauca) y también es similar a *Encyclia chloroleuca*, sin embargo se distingue por sus flores con sépalos y pétalos verde oliva a ocre, con labelo blanco cremoso el lóbulo central del labelo con varias quillas (al menos cinco), todas verrugosas y ligeramente teñidas de rojo-púrpura.

Introduction

William Jackson Hooker described *Encyclia* Hooker (1828: pl. 2831) based on a plant grown by Arnold Harrison, which was collected in the vicinity of Rio de Janeiro (Brazil) and brought to England by his brother William Harrison. The plant was named *Encyclia viridiflora* Hooker (1828: pl. 2831). Since then, more than 150 species have been described. The species of this genus grow preferentially in seasonally dry ecosystems, from Florida in the United States of America to northern Argentina. Usually they are found at altitudes below 1200 m, although some species, such as *Encyclia tuerckheimii* Schlechter (1918a: 410), reach up to ca. 2500 m (van den Berg & Carnevali 2005).

Taxonomically, *Encyclia* is a difficult genus for three reasons: (i) its circumscription has changed drastically, especially in the last 10−15 years (Dressler 1961, Sauleda 1988, Higgins 1997, 2001, 2002, Withner 1998, van den

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Berg & Chase 2004, van den Berg 2005, Leopardi *et al.* 2012); (ii) closely related species tend to be morphologically homogeneous, which leads to misunderstandings in the species limits (Pupulin & Bogarín 2011); (iii) further, some sets of unrelated species have converged on certain morphological characters, such as verrucae on the pedicellate ovary, absence of column wings, and the labellum with central and lateral lobes fused or partially fused, among others. This convergence of characters helps generate taxonomic confusion.

Encyclia chloroleuca (Hooker 1837: t. 3557) Neumann (1845: 138), *E. elegantula* Dressler (2004a: 243−244), *E. peraltensis* (Ames 1923: 46−48) Dressler (1997: 124), *E. patens* Hooker (1830: t. 3013), *E. silvana* Campacci (2003: 22), and *E. bohnkiana* Castro & Campacci (1999: 91−92), conform a species complex that has challenged taxonomists, because vegetative morphology is virtually identical between species and the differences between them have accumulated essentially in the flowers (Pupulin & Bogarín 2011). *Encyclia patens, E. silvana,* and *E. bohnkiana* will not addressed in this manuscript for reasons described below.

One of the most conflictive species is *Encyclia chloroleuca*, which is a well-understood entity found primarily in the Amazon, including the eastern Andean foothills and the Guayana region, and then northward, throughout Mesoamerica into southeastern Mexico (Oaxaca, Quintana Roo; Figure 1; Dodson 2010, Pupulin & Bogarín 2012, Silvera & Silvera 2012, Barros *et al.* 2013). This species is variable throughout its range and apparently has jumped some insurmountable barriers for other plant species, such as the the central depression of Nicaragua, the Talamanca Range, the super wet Darien area, and the Andes mountain ranges, among others. Several entities have been described based on morphological variants of *Encyclia chloroleuca*, some of which are currently referred to its synonymy (Appendix 1).

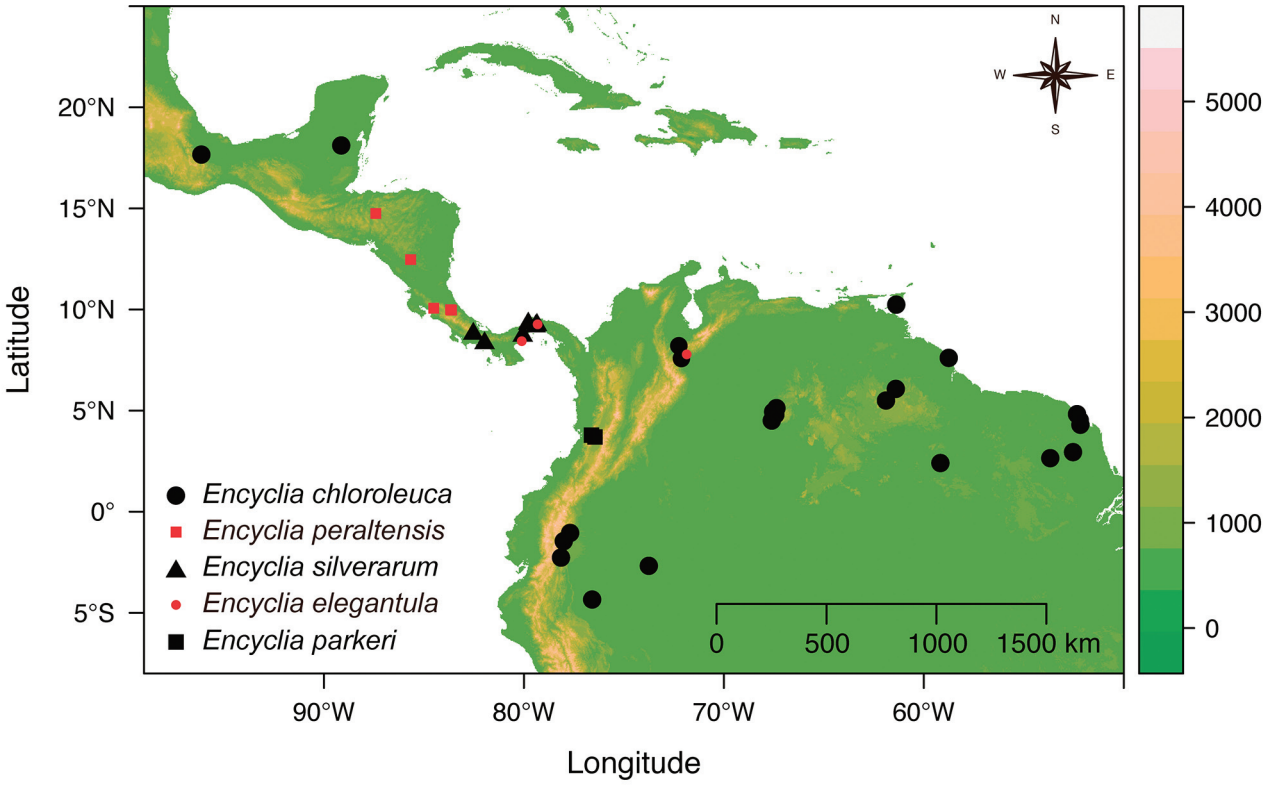

FIGURE 1. Distribution of species of the *Encyclia chloroleuca* complex included in this work. The color bar in the right side represents the altitude in meters.

Encyclia elegantula is a recently described species from Panama that also has been collected in Venezuela, and it is therefore likely to occur in Colombia (Figure 1). This species, like many others in the genus, prefers seasonally dry habitats below 1000 m altitude. *Encyclia elegantula* is the most distinctive species of the complex, not only because of its rachis and conspicuously warty pedicellate ovary (a character shared with *E. peraltensis*), but also by its colorful flowers. The labellum, with a magenta blotch, is undoubtedly one of its most distinctive characters (Dressler 2004a).

Encyclia peraltensis is a Central American species described in 1923 by Oakes Ames based on material collected in Costa Rica, but there are reports suggesting its presence in other countries such as Guatemala, Belize, Nicaragua,

and Honduras (Figure 1; Dressler 2004b, 2009, Pupulin & Bogarín 2012). Although this species has several unique characters, one that is evident is the conspicuously warty rachis and pedicellate ovary, which, in combination with the green flowers, along with several short, congested branches of the inflorescence, makes it easy to identify when compared with the other species of the complex.

Recently, material of two new species of *Encyclia* that may be included in this complex was brought to our attention: *Encyclia parkeri* which is native from Colombia, in the Río Grande Canyon, which is part of the Dagua river Basin in the Department of Valle del Cauca, and *Encyclia silverarum* which is native from Panama, and in the past had been referred by some authors (e.g., Dressler 2004a, Silvera & Silvera 2012) to *Encyclia amanda* (Ames 1923: 36−37) Dressler (1971: 440). However, a detailed review of the type strongly suggests that *E. amanda* is a synonym of *E. chloroleuca*, and therefore we describe the plant from Panama as a new species. In order to facilitate the identification of the new species, we provide a key to the species in the *Encyclia chloroleuca* complex that are geographically close to the new species, illustrations to aid in their identification, and a list of valid names and synonyms for the species included in this work. *Encyclia patens, E. silvana,* and *E. bohnkiana* are species restricted to the Atlantic slope of Brazil, these were explicitly excluded because it is unlikely they may be confused with any of the new species proposed herein.

Taxonomic treatment

Encyclia silverarum Leopardi & Carnevali, ***sp. nov.*** (Figure 2)

This species is very similar to Encyclia chloroleuca; however, it is easily distinguished by its color tending to pale green-yellowish brown and its falcate lateral lobes (versus perpendicular in E. chloroleuca), which are proportionately shorter (<0.60 cm long) than those of E. chloroleuca (>0.80 cm long).

Type:—PANAMA. Panamá: Capira, Bajo Bonito, 13 April 2012, *G. & K. Silvera, s.n.* (PMA!, holotype).

Epiphytic *herb*, 35 cm tall, up to 60 cm including the inflorescence. Rhizome tough, fibrous. *Pseudobulbs* 2.5−3.0 × 1.6−2.1 cm, clustered but shortly creeping, ovoid, apically 2−3-leaved, green and smooth when young, and finely wrinkled when old, when young clothed in white papyraceous, non-persistent sheaths. *Leaves* 18−20 × 1.7−0.9 cm, narrowly oblong elliptic, thick, rigid, midnerve carinate mainly in the lower half. *Inflorescences* 45−60 cm long, terminal, erect, a multiflowered raceme or panicle, peduncle green, smooth, thin but fairly strong. *Flowers* resupinate, showy, 2.2−2.5 cm across the spread apices of the petals; perianth segments leathery; sepals and petals pale green-yellowish brown; the labellum ground color white to creamy white, slightly tinged with maroon at the distal margin of the central lobe, and with five thicker nerves running down the callus into the apex, these nerves are colored with purple stripes, the lateral lobes tinged with maroon; the callus creamy white; column green, grading to creamy white on the distal half; sepals subsimilar but the lateral somewhat oblique, dorsal sepal: 1.30−1.40 × 0.40−0.50 cm, oblanceolate, obtuse or rounded, lateral sepals: 1.20−1.30 × 0.40−0.50 cm, lanceolate, slightly oblique, broadly acute to acuminate; petals 1.30−1.40 × 0.50−0.60 cm, spathulate, narrowed on the lower half to a narrow claw 0.10−0.15 cm wide; *labellum* conspicuously 3-lobed, free from column except at the base, total labellum length 1.05−1.15 cm, 0.90−1.00 cm across lateral lobes; the central lobe obovate to elliptic, with a small apiculus at apex, 0.60−0.65 × 0.55−0.60 cm; lateral lobes 0.55−0.60 cm long, 0.30−0.35 cm wide at mid-length, 0.35−0.40 cm wide at base, falcate, oblong, apically rounded to, the apex somewhat reflexed in natural position; callus 0.40−0.50 × 0.13−0.18 cm, subrhombic to quadrangular, composed of two broad, high keels running from just above the base of the labellum well (ca. 0.20 cm) into the blade of the central lobe, with a shallow, nearly oblong depression running from the base to the apex up to 3/4 of the total length of the callus, from the apex of the callus arises one elevated nerve that extends almost to the apex of the midlobe. *Column* 0.60−0.65 × 0.30−0.35 cm, 0.20 cm wide at base, 0.18 cm at its narrowest, 0.31 cm at its highest, semicylindric to slightly triangular, clavate in ventral outline, provided with a pair of triangular–subquadrate auricles on the apical fourth, auricles 0.10 cm long, 0.10 cm broad at the base; anther cream white to pale yellow, ca. 0.60 cm wide, 0.56 cm deep; pollinia 4, pale yellow, 0.23−0.28 × 0.18−0.22 cm, with yellow caudicles; stigmatic surface 0.16−0.18 × 0.16−0.18 cm, obovate; pedicellate ovary cylindrical, smooth, 1.70−1.80 cm long (Figure 2).

Discussion:—Since Oakes Ames described *Encyclia amanda* in 1923, it was thought that, in Central America, *E. chloroleuca* was replaced by this species, and therefore all specimens related to *E. chloroleuca*, including the Mexican

ones (e.g., Carnevali *et al.* 2001), were identified as *E. amanda*. However, a detailed examination of the holotype of *E. amanda* showed no difference between this concept and *E. chloroleuca* (see Figures 2−3; Pupulin & Bogarín 2012), and much of the herbarium material currently annotated as *E. amanda* actually corresponds to either *E. chloroleuca* (e.g. Figure 2 L−U, and Silvera & Silvera 2012), although plants tend to be a little less robust than South American specimens, or to what we here describe as *E. silverarum* (see key to species in the *E. chloroleuca* complex below).

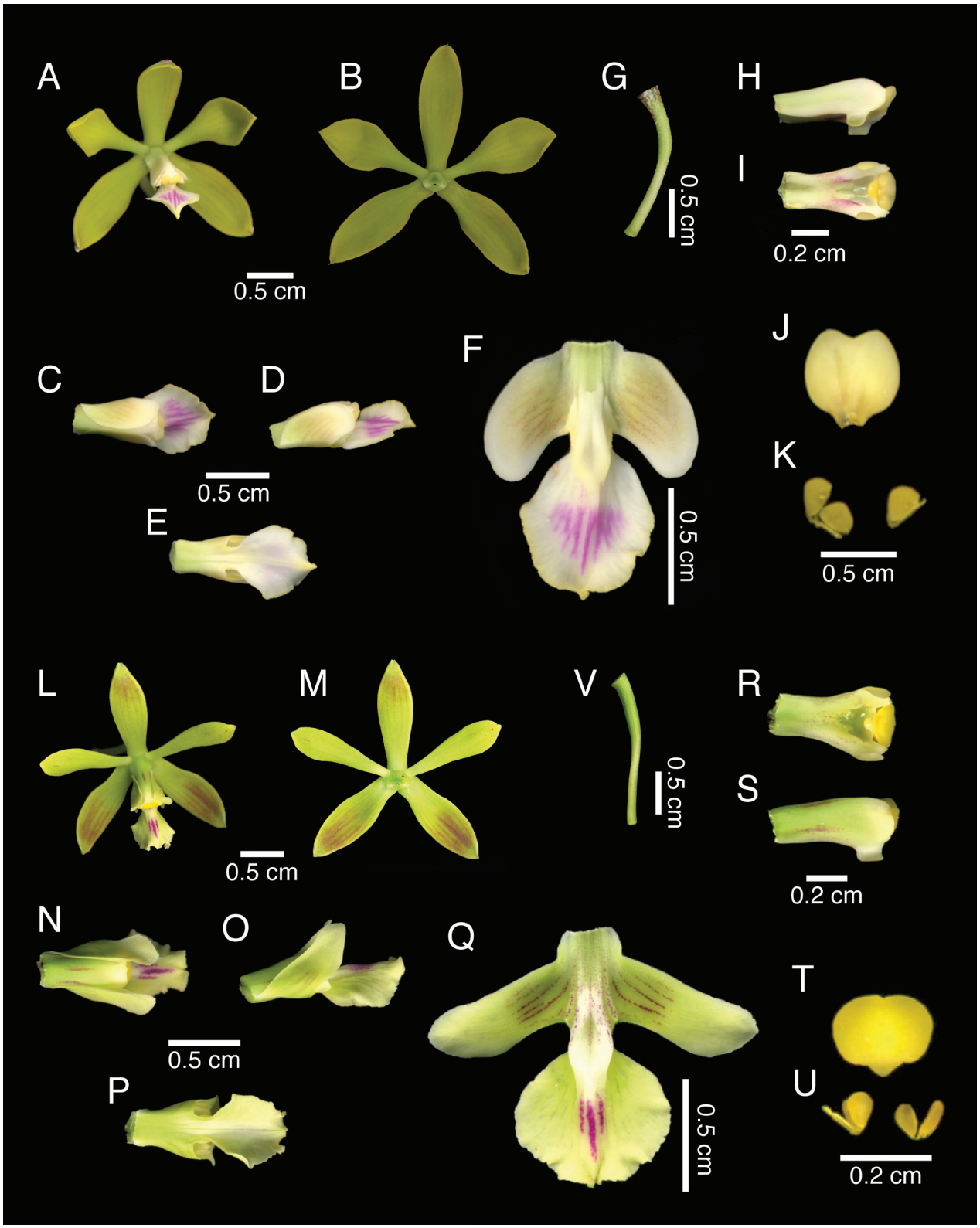

FIGURE 2. *Encyclia silverarum* Leopardi & Carnevali (A−K) and *Encyclia chloroleuca* (L−U). A, L. Flower in frontal view. B, M. Perianth. C−E, N−P. Column and labellum, in natural position, in dorsal (C, N), lateral (D, O), and ventral (E, P) views. F, Q. Spread labellum. G, V. Pedicellate ovary. H−I, R−S. Column in lateral (H, S) and ventral (I, R) views. J, T. Anther. K, U. Pollinarium. A−K, based on the holotype; L−U based on *Carnevali 6315* (CICY!).

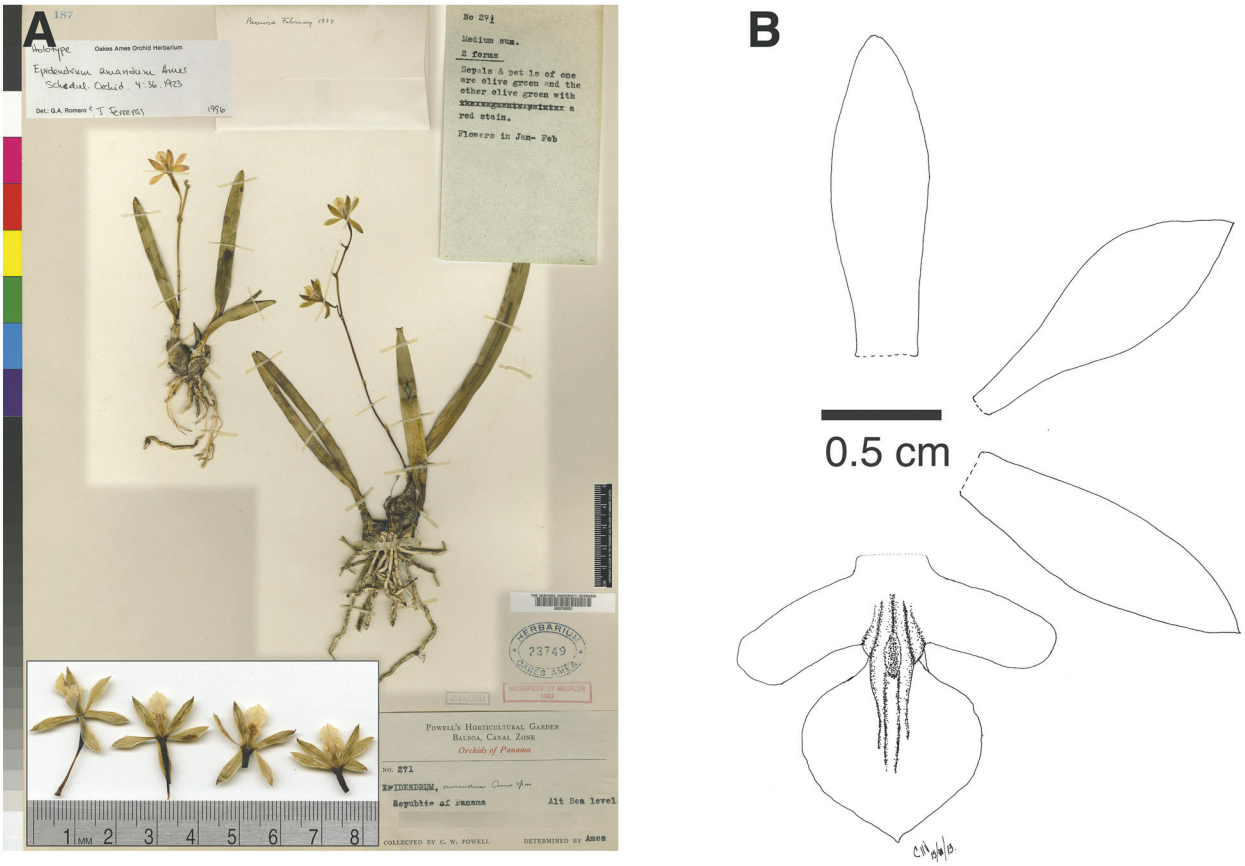

FIGURE 3. Dissection of *Encyclia amanda* (Ames) Dressler. A. Holotype of *Epidendrum* (*Encyclia*) *amandum* at the Oakes Ames Orchid Herbarium (AMES 00070063). B. Floral analysis of a flower from the type. Drawn by C. Leopardi from a re-hydrated flower with the aid of a camera lucida.

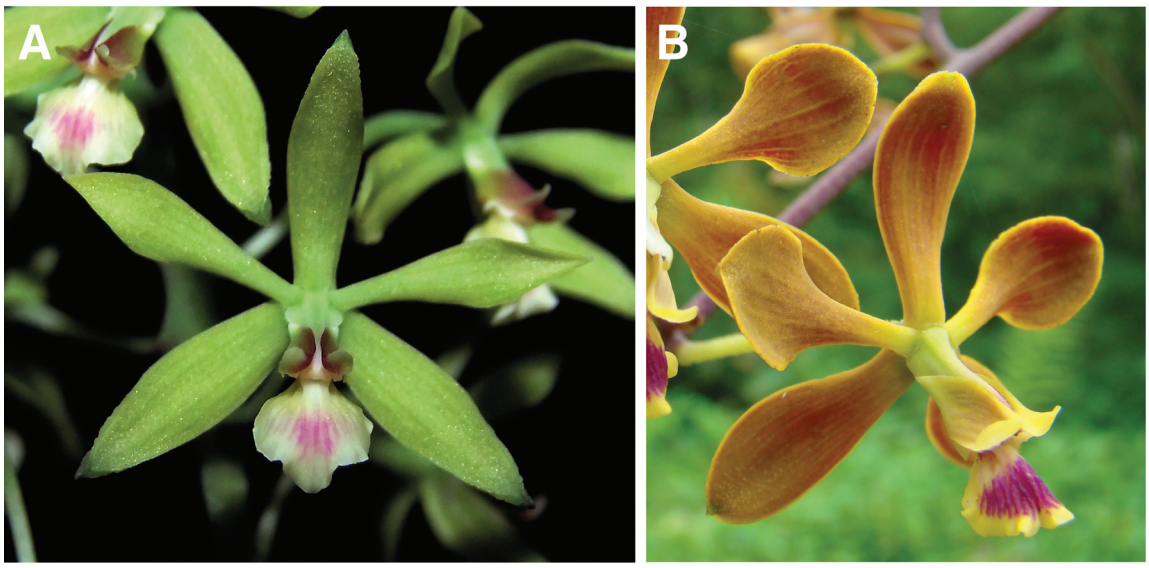

FIGURE 4. Other species of the *Encyclia chloroleuca* complex. A, *Encyclia peraltensis* from Costa Rica. B. *Encyclia elegantula* from Panama. A, by Carlos Leopardi; B, by Gaspar Silvera.

Encyclia silverarum has been reported from Panama as *E. amanda* (Dressler 2004a: photography of *E. amanda*, Silvera & Silvera 2012: table 1) and is very similar to *E. chloroleuca*, which also has been reported from that country (e.g., Silvera & Silvera 2012); however, it is easily distinguished by its color tending to pale green-yellowish brown and its falcate, proportionately shorter (<0.60 cm long) lateral lobes in comparison with those of *E. chloroleuca* which

are perpendicular and longer (>0.80 cm long; Figures 1−2). *Encyclia silverarum* is distinguished from *E. peraltensis* (Figure 4 A) by its proportionally short and wide lateral lobes. Moreover, flowers are ca. 2.2 cm across the spread apices of the petals, lateral lobes of the labellum 0.55−0.60 × 0.30 cm in *E. silverarum* and flowers ca. 1.0 cm across the spread apices of the petals 0.48−0.55 × 0.18 cm in *E. peraltensis*. The smooth pedicellate ovary and rachis of *E. silverarum* sharply contrast with that of *E. peraltensis*, where it is conspicuosly warty. *Encyclia peraltensis* is known from Belize, Guatemala, Honduras, and Costa Rica. The smooth central lobe of the labellum (provided only with a sharp keel) and the short and wide lateral lobes of the labellum also distinguishes *Encyclia silverarum* from *E. parkeri*, a South American species proposed below (Figures 1, 5).

Distribution and ecology:—*Encyclia silverarum* is known only from Panama (Figure 1). This species grows in tropical, shade-loving, broad-leaved montane or submontane forest. It was found within an area with a rugged, mountainous topography. The area is in the Panama Canal Watershed (Pacific slope). The temperature ranges from 19−32 ºC. The precipitation is ca. 2500 mm, and it is more or less evenly distributed throughout of the year; dry periods are short (1−2 weeks) and they occur between December to April. This area still holds altered remnants of primary and secondary forest. The main activity is cattle ranching and subsistence farming. Both, *Encyclia chloroleuca* and *E. elegantula* have also been found in this area.

Eponymy:—This new species honors Gaspar Silvera and his daughter Katia who collected the plants and provided us with material, illustrations, and ecological data. Gaspar is a well-known orchid nurseryman from Panama who has reproduced and raised many orchid species, including this one, from seeds. Katia is a specialist in the evolution of physiological mechanisms in epiphytes, particularly of CAM in orchids. The specific epithet was constructed in accordance to article 60C.1 (McNeill *et al.* 2012), which specifies that when honoring more that one person in an epithet whose name ends in "a", the correct plural form should be constructed with the addition of -rum; thus "*silvera-rum*" after the Silveras.

IUCN Conservation assessment:—Least Concern (LC). Although *Encyclia silverarum* has a distribution area of less than 20000 km^2 (Extent of Occurrence = 13752.90 km^2, based on the collections cited in this paper), the area occupied is greater than 2000 km^2 (Area of Occurrence = 4992.58 km^2, based on a cell of 35.33 km); therefore we decided to refer it to the LC category. While this species is not currently endangered, it would be desirable to keep it under observation. This conservation assessment was made with the help of GeoCAT software (Bachman *et al.* 2011), with the criteria suggested by Willis *et al.* (2003) about cell size and the use of herbarium material as data source.

Paratypes:—PANAMA. Colon: Near Agua Clara rain gauge, Santa Rita lumber road, 18 May 1972, *R. Dressler 4187* (MO!). Panama: Cerro Jefe, headwaters of Río Cascadas, 30 April 1971, *R. Dressler & N. Williams 4017* (MO!); between Cerro Azul and Cerro Jefe, 05 April 1970, *R. Dressler 3866* (MO!); Cerro Campana, 27 February 1971, *R. Dressler s.n.* (MO!).

Encyclia parkeri Reina-Rodríguez & Leopardi, ***sp. nov.*** (Figure 5)

Encyclia parkeri is similar to E. chloroleuca, but is distinguished by its flowers with olive-green to ocher petals and sepals, labellum creamy white, with the central lobe with many keels (at least three), all warty and usually slightly tinged red-purple.

Type:—COLOMBIA. Valle del Cauca: Restrepo, vereda El Aguacate, cercanía a finca Las Acacias, 16 August 2013, *G. Reina-Rodríguez, C. Lopera, O. Meneses & D. Pedraza 1694* (CUVC!, holotype; COL!, HUA!, isotypes).

Epiphytic *herb*, 40 cm tall, up to 76 cm including the inflorescence. Rhizome tough, fibrous. *Pseudobulbs* 3.10−6.00 × 2.20−3.50 cm, clustered but shortly creeping, ovoid, apically 3-leaved, green and smooth when young, and finely wrinkled when old, when young clothed in white papyraceous, non-persistent sheaths. *Leaves* 21−40 × 2.00−4.20 cm, narrowly oblong elliptic, somewhat twisted, thick, rigid, midnerve carinate mainly in the lower half. *Inflorescences* 45−66 cm long, terminal, erect, a multiflowered panicle, peduncle green, thin but fairly strong, upper portion of peduncle and rachis smooth, pedicellate ovaries slightly rough. *Flowers* resupinate, showy, 2.90−3.40 cm across the spread apices of the petals; perianth segments fleshy; sepals and petals olive-green to ocher, the nerves showing faintly, the margins narrowly but clearly outlined in pale green, the bases and very tips of the segments are almost devoid of the purplish overlay, and are thus pale greenish; the labellum ground color white to creamy white, with tiny purple spots above the nerves, the central lobe with 5 thicker nerves running down the callus into the apex, the lateral lobes only with the ground color, the callus white; column green, grading to white on the distal half; sepals subsimilar but the lateral somewhat oblique, dorsal 1.40−1.50 × 0.50−0.60 cm, oblanceolate, obtuse or broadly acute, lateral sepals:

1.40−1.50 × 0.48−0.58 cm, lanceolate, slightly oblique, broadly acute to acuminate; petals 1.30−1.40 × 0.60−0.70 cm, spathulate, narrowed on the lower half to a narrow claw 0.16−0.20 cm wide; *labellum* conspicuously 3-lobed, free from column except at the base, total labellum length 1.20−1.30 cm, 1.50−1.60 cm across lateral lobes; the central lobe orbicular to suborbicular, reduplicated *in vivo*, rounded at apex, 0.70−0.75 × 0.80−0.85 cm; lateral lobes 0.90−0.95 cm long, 0.30−0.35 cm wide at mid-length, 0.30−0.40 cm wide at base, oblong, apically rounded to broadly obtuse, the apices somewhat reflexed in natural position; callus 0.58−0.65 × 0.24−0.30 cm, subrhombic to quadrangular, composed of two broad, high keels running from just above the base of the labellum well (ca. 0.26 cm) into the blade of the central lobe, with a shallow, nearly oblong depression at running from the base to apex up to 3/4 of the total length of the callus, from the apex of the callus arise at least three elevated nerves that extend almost to the apex of the midlobe. *Column* 0.80−0.89 × 0.35−0.39 cm, 0.25 cm wide at base, 0.20 mm at its narrowest, 0.35 cm at its highest, hemicylindric to slightly triangular, clavate in ventral outline, provided with a pair of triangular–subquadrate auricles on the apical fourth, auricles 0.10 cm long, 0.13 cm broad at the base; anther pale yellow, 0.20 cm wide, 0.22 cm deep; pollinia 4, yellow, 0.85−0.89 × 0.11−0.13 cm, with yellow caudicles; stigmatic surface 0.16−0.18 × 0.15−0.17 cm, obovate; pedicellate ovary cylindrical, smooth at base, rough at apex, 2.00−2.50 cm long. Capsule elliptic, ca. 2.60−2.70 × 1.10−1.30 cm (Figure 5).

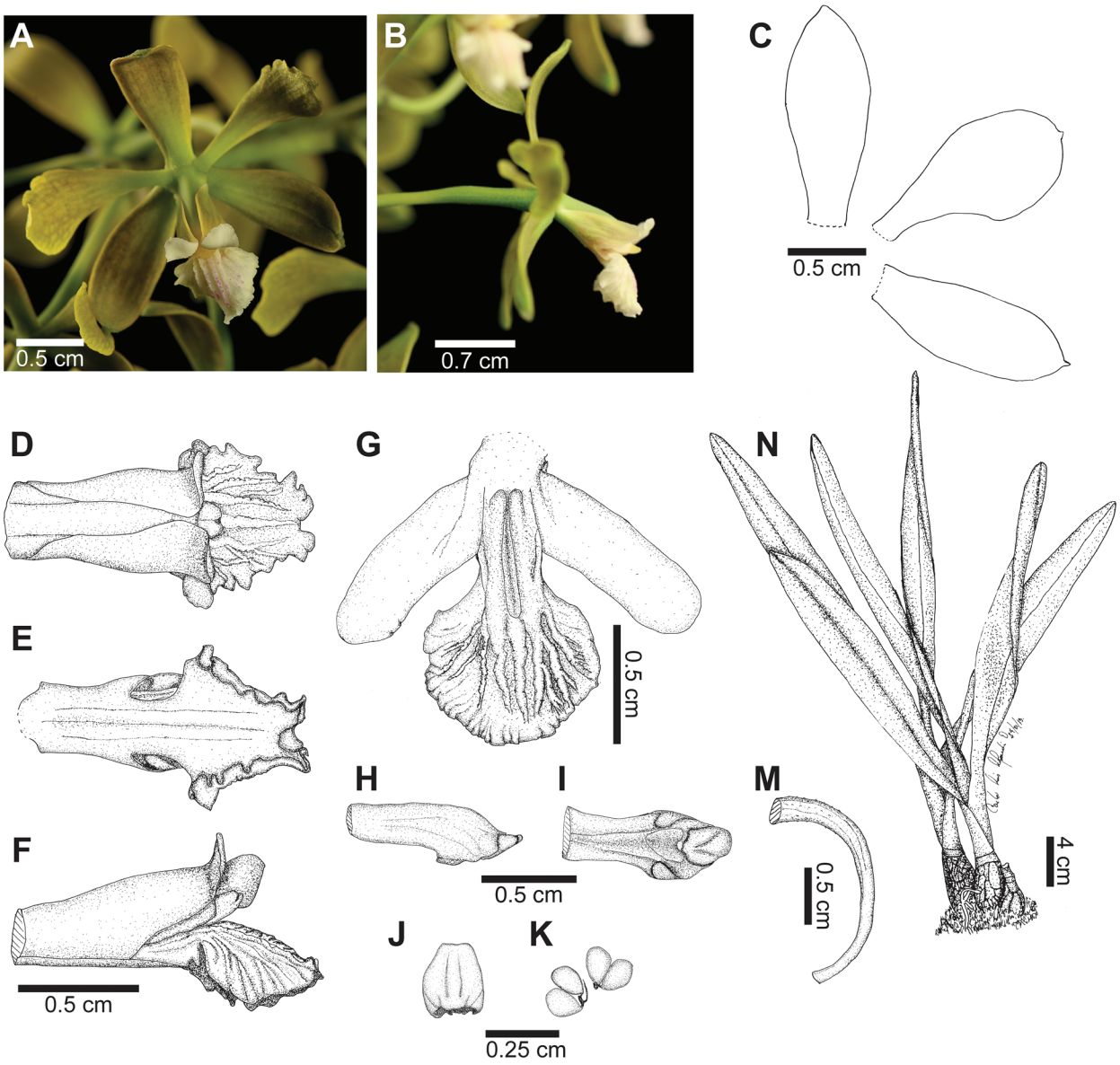

FIGURE 5. *Encyclia parkeri* Reina-Rodríguez & Leopardi. A−B. Flowers in frontal (A) and lateral (B) views. C. Perianth. D−F. Column and labellum in natural position in dorsal (D), ventral (E) and lateral (F) views. G. Spread labellum. H−I. Column in lateral (H) and ventral (I) views. J. Anther. K. Pollinarium. M. Pedicellate ovary. N. Habit. Drawings by C. Leopardi from re-hydrated flower with the aid of a camera lucida. A, based on the holotype, photo by F. López-Machado; B; by J. Parker; C−N, based on *C. Leopardi 469* (AMES!).

Discussion:—*Encyclia parkeri* differs from *E. chloroleuca* in the shorter and wider petals (on average 1.35 × 0.65 *vs*. 2.09 × 0.57 cm in the latter) and the central lobe of the labellum, that has at least three verrucose carinae (not smooth as in *E. chloroleuca*; Figure 2 L−U). In Colombia, *Encyclia chloroleuca* is found in the eastern foothills of the western mountains in the municipalities of Cali, Yotoco, Río Frío and Bolivar (Figure 1; Reina-Rodríguez *et al.* 2010).

Encyclia parkeri is distinguished from *E. silverarum* by the labellum which has a central lobe with verrucose carinae and longer lateral lobes. The central lobe of the labellum in *E. parkeri* features tiny purple spots whereas the perianth is tinged of maroon. In *E. silverarum*, on the other hand, the central lobe is smooth, the lateral lobes are shorter and wider and the keels of the central lobe of the labellum are colored with purple stripes. (compare Figures 1, 2 A−K, and 5 A−N). *Encyclia peraltensis* (Figures 1, 4 A) and *E. parkeri* are also easily distinguished by the conspicuously warty pedicellate ovary and peduncle of the former. *Encyclia peraltesis* has a smooth central lobe of the labelum whereas the same structure in *E. pakeri* feature warty keels. Colors of the midlobe also differ between booth taxa: *E. peraltensis* lacks color spots in the labellum (or only a single spot in the center), whereas in *E. parkerii* there are tiny purple spots (see key to species in the *E. chloroleuca* complex below and Figures 1, 5).

In Pastaza, Ecuador, several specimens similar to *Encyclia parkeri*, such as *Hirtz 895* (MO) and *Carnevali & Dodson 3492* (CICY!), have been collected. These specimens have been associated with *E. thienii,* a name proposed by Dodson (1989: t. 458). However, both the protologue of *E. thienii* and the drawings published (Dodson 2010: Fig. 100 C) elsewhere by Dodson show an entity very similar to *E. chloroleuca*; the more important differences mentioned by the author are the smaller flowers and the perianth green or yellowish in *E. thienii* (Dodson 2010: 423−424). Considering that *E. chloroleuca* is a very variable species, it is possible that *E. thienii,* as described by Dodson, should be referable to *E. chloroleuca*, whereas the different looking specimens featuring rugulose ovaries and labella belong in *E. parkeri.*

Distribution and ecology:—*Encyclia parkeri* is known from the canyon of "Río Grande", which is part of the Dagua subxerophytic enclave in the south-western Colombia Chocó bioregion. This area is located on the western slope of the Western Coordillera in the vicinity of the towns of Restrepo, La Cumbre, and Dagua, in the department of Valle del Cauca, Colombia (Figure 1).

The Dagua subxerophytic enclave of 23660 hectares forms an altitudinally complex plant community with cloud to subxerophytic forest at altitudes of 710 m in the canyon and up to 1780 m on the summits of the mountains. *Encyclia parkeri* was collected at 1300 m−1400 m in an area of transition between the subxerophytic shrubs and bushes of the lower part of the canyon with the sub-Andean flora of the upper part. Riparian vegetation forms forest patches of 80 meters wide, surrounded by natural grasslands and to some extent by introduced pastures (e.g., *Hyparrhenia rufa* (Nees 1829: 345) Stapf (1919: 304−307)), which are widely used as forage for cattle ranches.

The habitat where the species was found, locally called "zanjones", corresponds to a riverine forest with a canopy of 14 meters and a coverage of 45%, dominated by *Clusia fructiangusta* Cuatrecasas (1950: 33−34), *Chrysophyllum argenteum* Jacquin (1760: 15), *Myrsine guianensis* (Aublet, 1775: 121) Kuntze (1891: 402), and *Nectandra lineata* (Kunth, 1817: 165) Rohwer (1993: 209). Also, there is a community of epiphytes dominated by *Tillandsia fendleri* Grisebach (1865: 17).

Encyclia parkeri grows as an epiphyte at 120−200 cm from the ground on *Clusia fructiangusta*, *Calliandra pittieri* (Standley 1916: 104), *Chrysophyllum argenteum*, and *Daphnopsis americana* (Miller 1768) Johnston (1909: 242) as phorophytes; the soil is covered with a dense layer of litter. The plants of *E. parkeri* grow in places with an average light exposure, within the riverine vegetation. The terrain where this species grows has a complex topography, with strong slopes (50–75%) called "Hondonadas", which act as a natural barrier that protects this community from livestock and the strong winds from the Pacific that are constant during the afternoon. Areas with similar conditions have been detected in the "Río Garrapatas" canyon, 100 km to North on the Pacific slope, where there are very dry conditions and potential areas for the occurrence of *E. parkeri*.

Encyclia parkeri is geographically close to three species of *Encyclia* in the Cauca river valley: *Encyclia chloroleuca* (discussed earlier), *Encyclia ceratistes* (Lindley 1844: misc. 91) Schlechter (1919: 74), and *Encyclia betancourtiana* Carnevali and Ramírez (2004: 413−416). *Encyclia ceratistes* is distinguished from *E. parkeri* by the length of inflorescence, the number of flowers, the truncated lateral lobes and the long apical portion of the central lobe; this species grows in the eastern foothills of the western mountains and the Cauca river valley in the municipalities of Cali, Bolívar, and Sevilla (Reina-Rodríguez *et al.* 2010). *Encyclia betancourtiana*, occurring in Colombia in the western foothills of the central mountains in the municipality of Tuluá (Reina-Rodríguez *et al.* 2010), is distinguished by the completely warty rachis and pedicellate ovary.

The Dagua subxerophytic enclave receives from 832.9 mm/year at the Loboguerrero station (700 m) ranging to 1197.2 mm/year at the summit station (1500 m); (CVC 2009). The area has a bimodal pluviometric regimen, with two dry periods, the first from December to February and the second from June to August; July is the month of least

rainfall. The first rains of the year fall between March and May and the second rainy season extends from September to November. *Encyclia parkeri* has been seen in bloom during March, August, and October.

Eponymy:—This species is dedicated to Jeff Parker from Hawaii, who first brought this new species to our attention.

IUCN Conservation assessment:—Critically Endangered (CR). The known distribution area is less than 5000 km^2 (Extent of occurrence = 848.5 km^2, based on the collections cited in this paper), however the area occupied is lesser than 10 km^2, wich would qualify the species as Critically Endangered (CR) (Area of Occurrence = 1.5 km^2, based upon SIG calculations). There are, however, areas not explored in the department of Valle del Cauca, such as the río Garrapatas Canyon ca. 100 km to the north that features habitats apparently suitable for this species. *Encyclia parkeri* was collected within a protected area of 6418 hectares called "Distrito de Conservación de Suelos Cañon de Río Grande". This conservation assessment was made using IUCN (2012) categories directly with the available population data.

Paratypes:—COLOMBIA. State unknown, but possibly from Valle del Cauca. Without date, legally purchased from Orquifollajes as "*Encyclia* sp. 2", cultivated by David Hunt in Texas and grown from seed and flowered by Jeff Parker in Hawaii, sub *C. Leopardi 469* (AMES!, CICY!). Valle del Cauca: Vijes, vereda monte redondo, Hacienda El Tambor, Relicto superior de la vía, 1402 m, 8 October 2013. G. *Reina-Rodríguez, C. Lopera 1748* (CUVC!). Corregimiento de San Salvador, Finca Bachue, Zanjón Capa Rosa, 13 April 2012, *G. Reina-Rodríguez, O. Meneses & E. Vivas 1613* (CUVC!).

Key to species of the Encyclia chloroleuca complex included in this work

1. Pedicellate ovary and rachis rugose to warty 2
- Pedicellate ovary smooth or somewhat rugose in the distal portion; rachis smooth 3
2. Labellum with a conspicuous wine-colored blotch; petals spatulate, conspicuously clawed ..... *E. elegantula* (Figure 4)
- Labellum without a conspicuous wine-colored blotch, usually with some red stripes; petals lanceolate, usually not clawed..... ..... *E. peraltensis* (Figure 4)
3. Perianth pale green-yellowish brown; central lobe of labellum with smooth carinae; lateral lobes of labellum truncated, when flattened usually do not reach 1/2 of the length of the central lobe (<0.6 cm long)..... *E. silverarum* (Figure 2)
- Perianth green or yellowish green; central lobe of labellum with smooth or warty keels; lateral lobes of the labellum oblong, usually longer than the central lobe of the labellum (>0.75 cm long)..... 4
4. Central lobe of the labellum ovate, margin entire; three primary carinae smooth, secondary carinae absent, lateral lobes of the labellum, when flattened, forming an angle of 90° with the main axis of the labellum..... *E. chloroleuca* (Figure 2)
- Central lobe of labellum orbicular or obovate, sinuous or crenulate; main carinae warty; carinae, secondary usually warty, lateral lobes of the labellum, when flattened, forming an angle less than 90° with the main axis of the labellum ..... *E. parkeri* (Figure 5)

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References

Ames, O. (1923) New or noteworthy orchids from Central America and the Philippine Islands. *Schedulae orchidianae* 5: 1−40.

Aublet, F. (1775) *Histoire des Plantes de la Guiane Françoise, vol. 1*. P. F. Didot, Paris, 655 pp.

Bachman, S., Moat, J., Hill, A., de la Torre, J. & Scott B. (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *ZooKeys* 150: 117−126. http://dx.doi.org/10.3897/zookeys.150.2109

Barros, F. de, Vinhos, F., Rodrigues, V., Barberena, F., Fraga, C., Pessoa, E., Forster, W. & Menini. L. (2013) Orchidaceae. *In: Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: http://floradobrasil.jbrj.gov.br/ (accessed 17 July 2013).

Castro, V. & Campacci, M. (1999) *Encyclia bohnkiana* V.P. Castro & Campacci sp nov. *Boletim CAOB* 37: 91−92

Campacci, M. (2003) O gênero *Encyclia* no Brasil. *Côletánea de Orquídeas Brasileiras* 1: 1−32.

Carnevali, G. & Ramírez, I.M. (2004) Two new species of *Encyclia* (Orchidaceae: Laeliinae) from Venezuela. *Novon* 14: 413−419.

Carnevali, G., Tapia-Muñoz, J.L., Jiménez-Machorro, R., Sánchez-Saldaña, L., Ibarra-González, L., Ramírez, I.M. & Gómez, M.P. (2001) Notes on the flora of the Yucatán Peninsula II: A synopsis of the orchid flora of the Mexican Yucatán Peninsula and a tentative checklist of the Yucatan Peninsula Biotic Province. *Harvard Papers in Botany* 5: 383−466.

Cuatrecasas, J. (1950) Notas a la flora de Colombia X. *Revista de la Academia Colombiana de Ciencias Exactas, Fisicas y Naturales* 8: 33−64.

CVC (2009) Boletín hidroclimatológico. CD Room, Corporación Autónoma Regional del Valle del Cauca, Santiago de Cali.

Dodson, C.H. (1989) *Encyclia thienii* Dodson. *Icones Plantarum Tropicarum, ser. 2* 5: t.458.

Dodson, C.H. (2010) *Encyclia* Hook. *Flora of Ecuador* 87: 417−424.

Dressler, R.L. (1961) A reconsideration of *Encyclia* (Orchidaceae). *Brittonia* 13: 253−266. http://dx.doi.org/10.2307/2805341

Dressler, R.L. (1971) Nomenclatural notes on the Orchidaceae - V. *Phytologia* 21: 440−443.

Dressler, R.L. (1997) New species and combinations in Costa Rican Orchids. *Novon* 7: 120−126. http://dx.doi.org/10.2307/3392183

Dressler, R.L. (2004a) *Encyclia elegantula*: An attactive and unexpected new species from Panama. *Orchid Digest* 68: 243−244.

Dressler, R.L. (2004b) A key to the Central American species of *Encyclia*. *Orchid Digest* 68: 88−92.

Dressler, R.L. (2009) Orchidaceae (in part). *Flora Mesoamericana* 7: 1−446.

Grisebach, A. (1865) Ueber die von Fendler in Venezuela gesammelten Bromeliaceen. *Nachrichten von der Königlichen Gesellschaft der Wissenschaften und von der Georg-Augusts-Universität* 1864: 1−21.

Higgins, W. (1997) A reconsideration of the genus *Prosthechea* (Orchidaceae). *Phytologia* 82: 370−383.

Higgins, W. (2001) *Oestlundia*: A new genus of Orchidaceae in Laeliinae. *Selbyana* 22: 1−4.

Higgins, W. (2002) Validation of *Microepidendrum* (Orchidaceae: Laeliinae). *Acta Botánica Mexicana* 60: 19−24.

Hooker, W.J. (1828) *Encyclia viridiflora*. *Botanical Magazine* 55: pl. 2831.

Hooker W.J. (1830) *Encyclia patens*. Spreading-flowered *Encyclia*. *Botanical Magazine* 57: t. 3013.

Hooker, W.J. (1837) *Epidendrum chloroleucum*. *Botanical Magazine* 64: t. 3557.

IUCN. (2012) *2001 IUCN Red List Categories and Criteria: version 3.1*. International Union for Conservation of Nature and Natural Resources. Available from: http://www.iucnredlist.org/ (accessed 10 October 2012).

Jacquin, N. (1760) *Enumeratio Systematica Plantarum, quas in insulis Caribaeis*. Lugduni Batavorum [Leiden]: Apud Theodorum Haak, Zug, Switzerland, 41 pp.

Johnston, J. (1909) Contributions from the Gray Herbarium of Harvard University. New series.—No. XXXVII. Flora of the island of Margarita and Coche, Venezuela. *Proceedings of the Boston Society of Natural History* 34: 163−312

Kunth, K. (1817) *Nova Genera et Species Plantarum, vol. 2.* Lutetiae Parisiorum: sumtibus Librariae Graeco-Latino-Germanico, 562 pp.

Kuntze, C. (1891) *Revisio Generum Plantarum, vol. 2*. A. Felix, Leipzig, 638 pp.

Leopardi, C.L., Carnevali, G. & Romero-González, G.A. (2012) *Amoana* (Orchidaceae, Laeliinae), a new genus and species from Mexico. *Phytotaxa* 65: 23−45.

Lindley, J. (1844) *Epidendrum ceratistes*. Edward's Botanical Register, 30: misc. 91.

McNeill, J., Barrie, F., Buck, W., Demoulin, V., Greuter, W., Hawksworth, D., Herendeen, P., Knapp, S., Marhold, K., Prado, J., Prud'Homme, W., Smith, G., Wiersema, J. & Turland, J. (2012) *International code of nomenclature for algae, fungi, and plants (Melbourne Code)*. Koeltz Scientific Books, Koenigstein, 240 pp.

Miller, P. (1768) *The gardeners dictionary*. Published for the author and sold by John and Francis Rivington, London, 1367 pp.

Nees, C.G.D. (1829) *Flora Brasiliensis seu Enumeratio Plantarum, vol. 2*. J. G. Cottae, Stuttgart & Tübingen, 386 pp.

Neumann, J. (1845) Quatre nouvelles Orchidées. *Revue Horticole, ser. 2* 4: 137−138.

Pupulin, F. & Bogarín, D. (2011) Of greenish *Encyclia*: Natural variation, taxonomy, cleistogamy, and a comment on DNA barcoding. *Lankesteriana* 11: 325−336.

Pupulin, F. & Bogarín, D. (2012) A taxonomic revision of *Encyclia* (Orchidaceae: Laeliinae) in Costa Rica. *Botanical Journal of the Linnean Society* 168: 395−448. http://dx.doi.org/10.1111/j.1095-8339.2012.01212.x

Reina-Rodríguez, G.A., Ospina-Calderón, N.H., Castaño, A., Soriano, I. & Otero, J.T. (2010) Catálogo de las orquídeas del valle geográfico del Río Cauca y su piedemonte andino bajo. Suroccidente colombiano. *Cespedesia* 32: 7−22.

Rohwer, J.G. (1993) Lauraceae: Nectandra. *Flora Neotropica* 60: 1−332.

Sauleda, R.P. (1988) A revision of the genus *Psychilis* Rafinisque (Orchidaceae). *Phytologia* 65: 1−33.

Schlechter, R. (1918) Kritische Aufzählung der bisher aus Zentral-Amerika bekanntgewordenen Orchidaceen. *Beihefte zum Botanischem Centralblatt. Original Arbeiten, Kassel* 36: 321−520.

Schlechter, R. (1919) Die Orchideen der südamerikanischen Kordillerenstaaten I. Venezuela. *Repertorium specierum novarum regni vegetabilis. Beihefte* VI: 1−100.

Silvera, K. & Silvera, G.A. (2012) *Encyclia chloroleuca* (Orchidaceae: Laeliinae) reported for Panama. *Kew Bulletin* 67: 1−3. http://dx.doi.org/10.1007/s12225-012-9378-0

Stapf, O. (1919) *Flora of Tropical Africa, vol. 9.* Crown Agents for Overseas Governments and Administrations, London, pp. 193−384.

Standley, P. (1916) Studies of Tropical American Phanerogams − No. 2. *Contributions from the United States National Herbarium* 18: 87−142.

van den Berg, C. (2005) Subtribe Laeliinae. *In:* Pridgeon, A., Cribb, P., Chase, M. & Rasmussen, F. (Eds.) *Genera orchidacearum*, *vol. 4.* Oxford University Press, Oxford, pp. 181−186.

van den Berg, C. & Carnevali, G. (2005) *Encyclia* Hook. *In:* Pridgeon, A., Cribb, P., Chase, M. & Rasmussen F. (Eds.) *Genera Orchidacearum*, *vol. 5.* Oxford University, Oxford, pp. 232−236.

van den Berg, C. & Chase, M. (2004) A chronological view of Laeliinae taxonomic history. *Orchid Digest* 68: 226−230.

Willis, F., Moat, J. & Paton, A. (2003) Defining a role for herbarium data in Red List assessments: a case study of *Plectranthus* from eastern and southern tropical Africa. *Biodiversity and Conservation* 12: 1537−1552.

Withner, C. (1998) *The Cattleyas and their relatives, vol. V: Brassavola, Encyclia, and other genera of Mexico and Central America*. Timber Press, Portland, 198 pp.

Appendix 1

Valid names and synonyms in the species complex *Encyclia chloroleuca*

[Names in bold refer to accepted species]

1. *Encyclia amanda* (Ames) Dressler = ***Encyclia chloroleuca*** (Hook.) Neumann
2. *Encyclia acuta* Schltr. = ***Encyclia chloroleuca***
3. ***Encyclia chloroleuca***
4. ***Encyclia elegantula*** Dressler
5. *Encyclia maravalensis* Withner = ***Encyclia chloroleuca***
6. ***Encyclia parkeri*** Reina-Rodríguez & Leopardi
7. ***Encyclia peraltensis*** (Ames) Dressler
8. ***Encyclia silverarum*** Leopardi & Carnevali
9. *Encyclia thienii* Dodson = ***Encyclia chloroleuca***
10. *Encyclia viridiflava* L.C.Menezes = ***Encyclia chloroleuca***
11. *Epidendrum acutum* (Schltr.) A.D.Hawkes = ***Encyclia chloroleuca***
12. *Epidendrum amandum* Ames = ***Encyclia chloroleuca***
13. *Epidendrum chloranthum* Lindl. = ***Encyclia chloroleuca***
14. *Epidendrum chloroleucum* Hook. = ***Encyclia chloroleuca***
15. *Epidendrum peraltense* Ames = ***Encyclia peraltensis***

Appendix 2

Additional revised material

Encyclia chloroleuca: BELIZE. south side of Hummingbird highway in Grapefruit Ochrad, 25 December 1984, *P. Catling & V. Brownell 9.10* (AMES!). ECUADOR. Pastaza: Puyo, 1000 msnm, April 1983, *Hirtz 895!* (MO!); Pastaza: Puyo, km 56 road Tena−Puyo, 950 m, 30 March 1994, *G. Carnevali & C. Dodson 3492* (CICY!). FRENCH GUYANA. Rivière Kursibo − Bassin du Sinnamary, 60 m, 09 February 1995, *G. Cremers & C. Pawilowski 13747* (CAY!); Roche Touatou − Bassin de l'Oyapock, 150 m, 18 May 1995, *G. Cremers & J. Granville 13992* (CAY!). GUYANA: Montagne of Kew, 20 May 1985, *C. Fevillet 2274* (CAY!). Rives de l'Approuague, entre la critique Maripa et St Machineau, 01 February 1967, *Oldeman 2436* (CAY!). MEXICO. Quintana Roo: Mun. P. Othón Blanco, "La Socorrito" a 500 m de la carretera a "Dos Aguas", 18 February 1999, *L. Ibarra et al. 66A* (CICY!); Oaxaca: km 51.5 del camino Reforma−Uzumacín, adelante de Ayozintepec, 20 December 2000, *G. Carnevali 6315* (CICY!). VENEZUELA. Amazonas: Dpto. Atures, Río Guayapo (Cuenca del río Sipapo), 96 msnm, 11 October 1988, *G. Romero & F. Guánchez 1673* (VEN!); Bolívar: Piedra de La Virgen, 1995, *G. Carnevali 3780* (VEN! , CICY!); Táchira: Hato Frío, 1992, *G. Carnevali 3022* (VEN! , CICY!), Río Frío, January 1992, *G. Carnevali 4443* (VEN! , CICY!). ***Encyclia elegantula***: VENEZUELA. Táchira: 10 (airline) km E of La Fundación, 13−23 km by road, around Represa Dorada, 600−900 msnm, 30 April 1981. *R. Liesner & M. Guariglia 11592* (MO!). ***Encyclia peraltensis***: COSTA RICA. Peralta, *Lankester & Sancho 378* (tipo, AMES!).