Phytotaxa 520 (3): 241–248
https://www.mapress.com/j/pt/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.520.3.2

A new species of *Kohleria* (Gesneriaceae) from Southwestern Colombia

KATHERIN ARANGO-GÓMEZ[1,2,4], LAURA CLAVIJO[2,3,5] & ALEJANDRO ZULUAGA[1,2,6]

[1] *Departamento de Biología, Universidad del Valle, Calle 13 # 100-00, Cali, Colombia*
[2] *Grupo de Investigación Ecología y Diversidad Vegetal, Universidad del Valle, Cali, Colombia*
[3] *Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia*
[4] *kathe.ag63@gmail.com; https://orcid.org/0000-0002-5606-2409*
[5] *lvclavijor@unal.edu.co; https://orcid.org/0000-0002-3009-9158*
[6] *zuluaga.alejandro@correounivalle.edu.co; https://orcid.org/0000-0002-5874-6353*

Abstract

A new species of *Kohleria* (Gesneriaceae) is described from the Colombian Andes, in the departments of Huila and Cauca. The new species, *Kohleria huilensis,* has long been documented from the Merenberg Natural Reserve (La Plata, Huila), but has been confused with *K. inaequalis* var. *inaequalis* and *K. inaequalis* var. *ocellata*. The new species is distinguished by the following characters: white sericeous and sparse villous indumenta on vegetative structures; calyx lobes elongate with revolute margins; corolla magenta to fuchsia, ventral lobe orbicular with apex truncate; filaments hirsute with glandular trichomes distally; and staminodes < 2.8 mm long.

Keywords: Andes, Central Cordillera, *Kohleria*, Gloxiniinae

Resumen

Se describe una especie nueva de *Kohleria* (Gesneriaceae) de los Andes colombianos, en los departamentos de Huila y Cauca. La nueva especie, *Kohleria huilensis*, se ha recolectado a lo largo de los años en la Reserva Natural Merenberg (La Plata, Huila), pero se ha confundido con *K. inaequalis* var. *inaequalis* y *K. inaequalis* var. *ocellata*. La nueva especie se distingue por los siguientes caracteres: indumento blanquecino en las estructuras vegetativas compuesto por una combinación de seríceo y viloso; lóbulos del cáliz elongados con márgenes revolutas; corola magenta a fucsia, lóbulo ventral orbicular con ápice truncado; filamentos hirsutos con tricomas glandulares distalmente; y estaminodio < 2.8 mm de largo.

Palabrasclave: Andes, Cordillera Central, *Kohleria*, Gloxiniinae

Introduction

Kohleria Regel (1847: 3), with 22 species (Clark & Jost 2021), is a neotropical genus of the flowering plant family Gesneriaceae, tribe Gesnerieae, subtribe Gloxiniinae (Weber *et al.* 2013). The genus ranges from northern Mexico to southern Peru, with the highest diversity found in Colombia, where at least 80% of the species occur (Kvist & Skog 1992, Arango *et al.* 2019). *Kohleria* is distinguished by the presence of scaly rhizomes, and sometimes stolons, inflorescences grouped into frondose or frondo-bracteose synflorescences, tubular corollas with a conspicuously colored limb often with dark colored spots and/or lines, five free nectary glands, usually two of them basally fused or placed closely together, and stigma bilobed or stomatomorphic (Arango *et al.* 2019).

In Colombia, the Central Cordillera and the valleys of the Cauca and Magdalena rivers harbor the largest diversity of *Kohleria* (Arango *et al.* 2019). Unfortunately, the Colombian Andes have suffered the highest deforestation rates in the region, surpassed only by the Amazon (IDEAM 2017), to such extent that in Colombia about 70% of the native Andean forest has been lost (Cavelier & Etter 1995, Kattan 2003, Victorino 2012). To counteract the threats imposed by deforestation, several Andean areas are under protection, either as National Natural Parks or as Private Reserves within the Colombian Network of Natural Reserves (Cavelier *et al.* 2001).

Accepted by Lúcia G. Lohmann: 4 Aug. 2021; published: 21 Sept. 2021

The Merenberg Natural Reserve is an important conservation model in Colombia (Parques Nacionales Naturales de Colombia 2015, Carvajal *et al*. 2017). It was established in 1932 as the first privately owned protected area in Colombia. It was not until 1960, nearly three decades later, that Colombia established its first National Natural Park "Cueva de Los Guácharos". The Merenberg Natural Reserve is located on the eastern slope of the Central Cordillera (2°13'N, 76°7'W), in La Plata, Huila, between 2200 and 2400 m elev., with an average annual precipitation of 2000 mm and a temperature between 12 and 18°C (Carvajal *et al*. 2017). The reserve protects 311.5 ha, of which 57% corresponds to primary forest. It is considered a strategic ecosystem due to the presence of habitats and natural corridors that protects numerous species of birds and mammals (Carvajal *et al*. 2017).

Our recent expeditions to the Merenberg Natural Reserve allowed us to confirm the presence of *Kohleria tigridia* (Ohlend. in Otto & Dietrich 1845: 376) Roalson & Boggan (2005: 229) and to collect individuals of an unknown species of *Kohleria.* After studying herbarium specimens previously collected in the reserve and surrounding areas, it became clear that this unknown species was misidentified as *Kohleria inaequalis* var. *inaequalis* (Bentham 1846: 230) Wiehler (1978: 62) or *K. inaequalis* var. *ocellata* (Hooker, 1848: 4359) L.P.Kvist & L.E.Skog (1992: 54). Here, we describe and illustrate this new species, increasing the number of *Kohleria* to 23 species, and compare it with the similar *K. inaequalis*.

Taxonomy

Kohleria huilensis Arango-Gómez, Clavijo & Zuluaga *sp. nov.* (Figures 1 & 2)

Type:—COLOMBIA. Huila: Municipio La Plata, vereda Candelaria, finca Meremberg-Agua Bonita, 2315 m, 2°13'10.0" N, 76°07'4.4" W, 20 April 2018 (fl), *A. Zuluaga, A. Muñoz; M.E. Cardona; K. Arango & Curso Botánica Sistemática I-2018 2478* (holotype: CUVC!; isotypes: COL!, HUA!, MO!, SEL!, SURCO!)

Diagnosis: *Kohleria huilensis* is distinguished by the following combination of characters: white sericeous and sparse villous indumenta on vegetative structures; leaves strigose adaxially, with trichomes of different lengths; calyx lobes elongate with revolute margins; corolla magenta to fuchsia, ventral lobe orbicular with apex truncate; filaments hirsute with glandular trichomes distally; and staminode < 2.8 mm long.

Herb or subshrub; terrestrial. Scaly *rhizomes* absent. *Stem* erect, less than 1 m tall, subwoody, terete in cross-section, 1.5–4.3 mm diameter, sericeous, trichomes whitish when live, brownish when dry, uniseriate with 2–6 cells, 0.7–1.9 mm long, combined with sparse villous indument; internodes 1.4–9.1 cm long. *Leaves* opposite, decussate, evenly spaced to slightly clustered at the apex of the branches, equal to subequal in a pair; petiole 1.4–6.5 cm long, terete in cross-section, sericeous, trichomes with 2–8 cells, 1.0–2.4 mm long, combined with sparse villous indument; blade ovate to slightly lanceolate, 4.9–16.7 × 2.4–8.1 cm, chartaceous, apex acute to acuminate, base cuneate to slightly rounded, sometimes oblique, margin crenate to serrulate, strigose adaxially, with trichomes of different lengths, sparse villous abaxially, veins with a mixture of dense villous and sericeous indument, 7–9 pairs of main lateral veins, higher order venation only evident abaxially. *Synflorescence* frondose; partial florescence axillary, with 1–3 flowers on an erect peduncle, rarely absent; *peduncle* 2.3–58.9 mm long, sericeous, combined with sparse villous indument; bracts opposite, 1.6–10.2 × 0.4–1.0 mm, lanceolate, apex acuminate to acute, base rounded to truncate, margin entire, sericeous, combined with sparse villous indument on both surfaces. *Pedicel* erect, 15.9–53.1 mm long, 0.6–1.3 mm diameter, sericeous, combined with sparse villous indument. *Calyx* chartaceous, pale green with 1 or 3 longitudinal green veins, 10.1–15.7 mm long; calyx lobes 5, erect, equal, elongate with revolute margins (rolled backward), fused at base for 0.8–1.6 mm, lobes 7.5–11.6 × 1.4–3.1 mm, apex acuminate, rarely acute, margin entire, strigose adaxially, more abundant basally and with trichomes of different lengths, sericeous, combined with sparse villous indument abaxially. *Corolla* zygomorphic, tubular, ampliate toward the throat and sub-ventricose ventrally, oblique relative to the calyx, 21.4–25.3 mm long; tube 16.8–23.6 mm long, 6.6–13.2 mm wide, base 4.0–6.6 mm wide, constriction above the base 3.5–5.2 mm wide, outside magenta to fuchsia, and villous with trichomes of different lengths, inside white-pink with magenta lines and spots, and hirsute basally; throat 4.7–5.8 mm diameter, with glandular trichomes; limb 19.6–24.7 mm diameter, lobes subequal, white-pink with magenta lines and spots, recurved, margin entire, orbicular (dorsal lobe sometimes oblate), villous abaxially, ventral and dorsal lobes glabrescent apically, with glandular trichomes basally and adaxially, ventral lobe 8.0–8.9 × 6.6–8.4 mm, apex truncate, lateral lobes 6.3–8.8 × 5.8–8.2 mm, apex rounded, dorsal lobes 5.3–7.2 × 6.2–7.5 mm, apex rounded. *Androecium* of 4 didynamous stamens; filaments 20.7–24.8 mm long, adnate to the base of the corolla tube for 0.6–1.1 mm, coiling after anthesis, hirsute, with glandular trichomes

distally; staminode 2.2–2.8 mm long, scarcely hirsute; anthers 2.0–2.8 × 0.7–1.2 mm, oblong, coherent by the apex and lateral walls, dehiscence by longitudinal slits. *Gynoecium* with five free nectary glands, rarely with two of these placed closely together, 1.4–1.9 × 0.9–1.2 mm, oblong, apex retuse or truncate; ovary inferior, narrowly elliptic, 4.0–5.3 × 1.9–2.3 mm; style 13.9–22.2 mm long, hirsute proximally, with glandular trichomes distally, stigma bilobed with glandular trichomes. *Fruit* a dry capsule, narrowly elliptic, ca. 8.2 × 3.1 mm; seeds not observed.

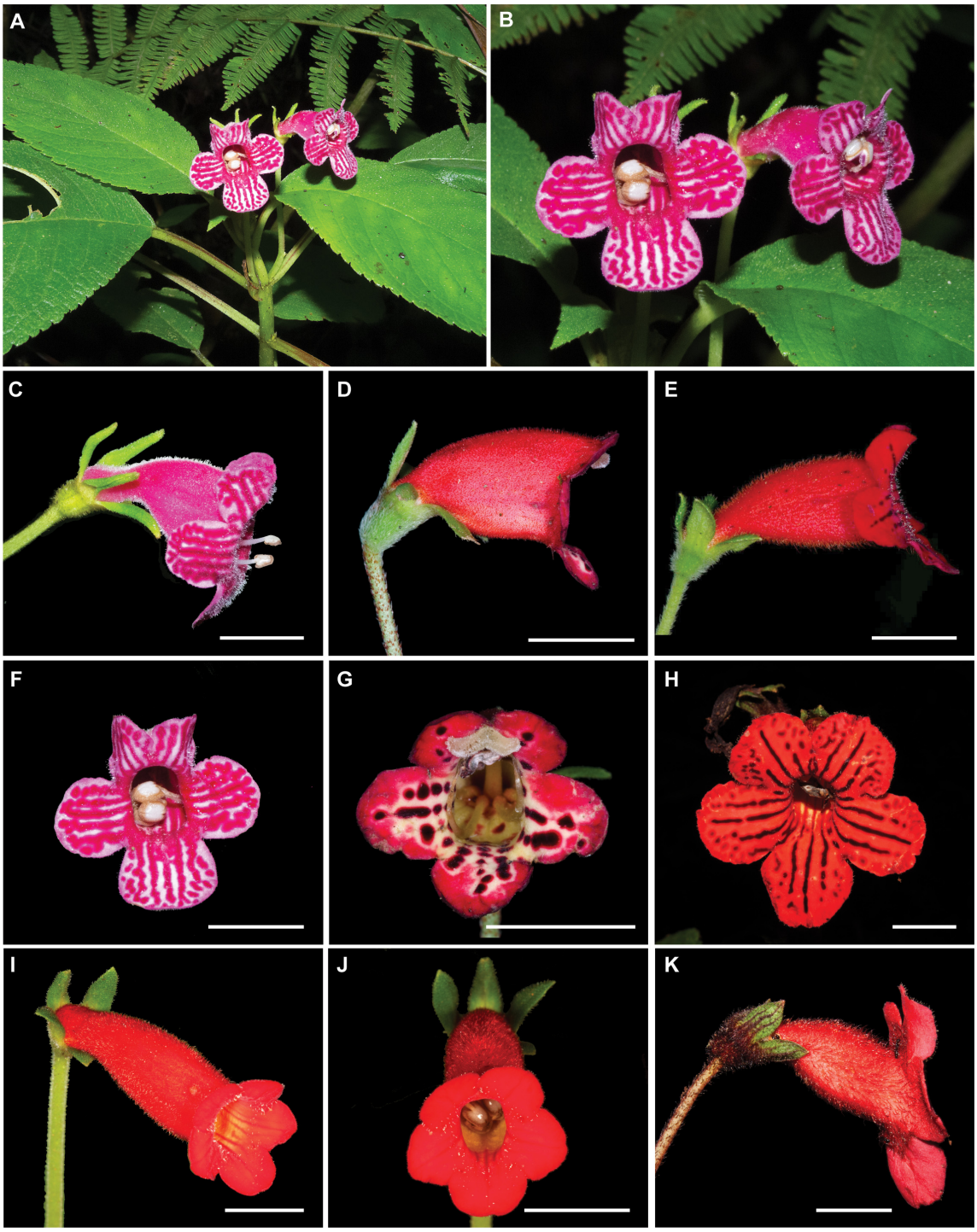

FIGURE 1. *Kohleria huilensis* Arango-Gómez, Clavijo & Zuluaga, *sp. nov.* (A, B, C, F), *K. inaequalis* var. *inaequalis* (E, H, K), *K. inaequalis* var. *ocellata* (D, G), and the morphotype from Cerro El Inglés (I, J). **A.** Habit, **B.** Flowers, **C.** Lateral view of flower (*K. huilensis*), **D.** Lateral view of flower (*K. inaequalis* var. *ocellata*), **E.** Lateral view of flower (*K. inaequalis* var. *inaequalis*), **F.** Front view of flower (*K. huilensis*), **G.** Front view of flower (*K. inaequalis* var. *ocellata*), **H.** Front view of flower (*K. inaequalis* var. *inaequalis*), **I.** Lateral view of flower (Cerro El Inglés morphotype), **J.** Front view of flower (Cerro El Inglés morphotype), **K.** Lateral view of *K. inaequalis* var. *inaequalis* showing the reddish pilose indument. (A–C, F from the holotype; D and G from *J.L. Clark 13327*; E from *J.L. Clark 13161*; H and K from *A. Zuluaga 2136*; I and J from *L. Clavijo 1703*; scale bar in C–K = 1 cm. Photos: A–C, F, I and J by A. Zuluaga; D, E and G by J.L. Clark; H and K by L. Clavijo).

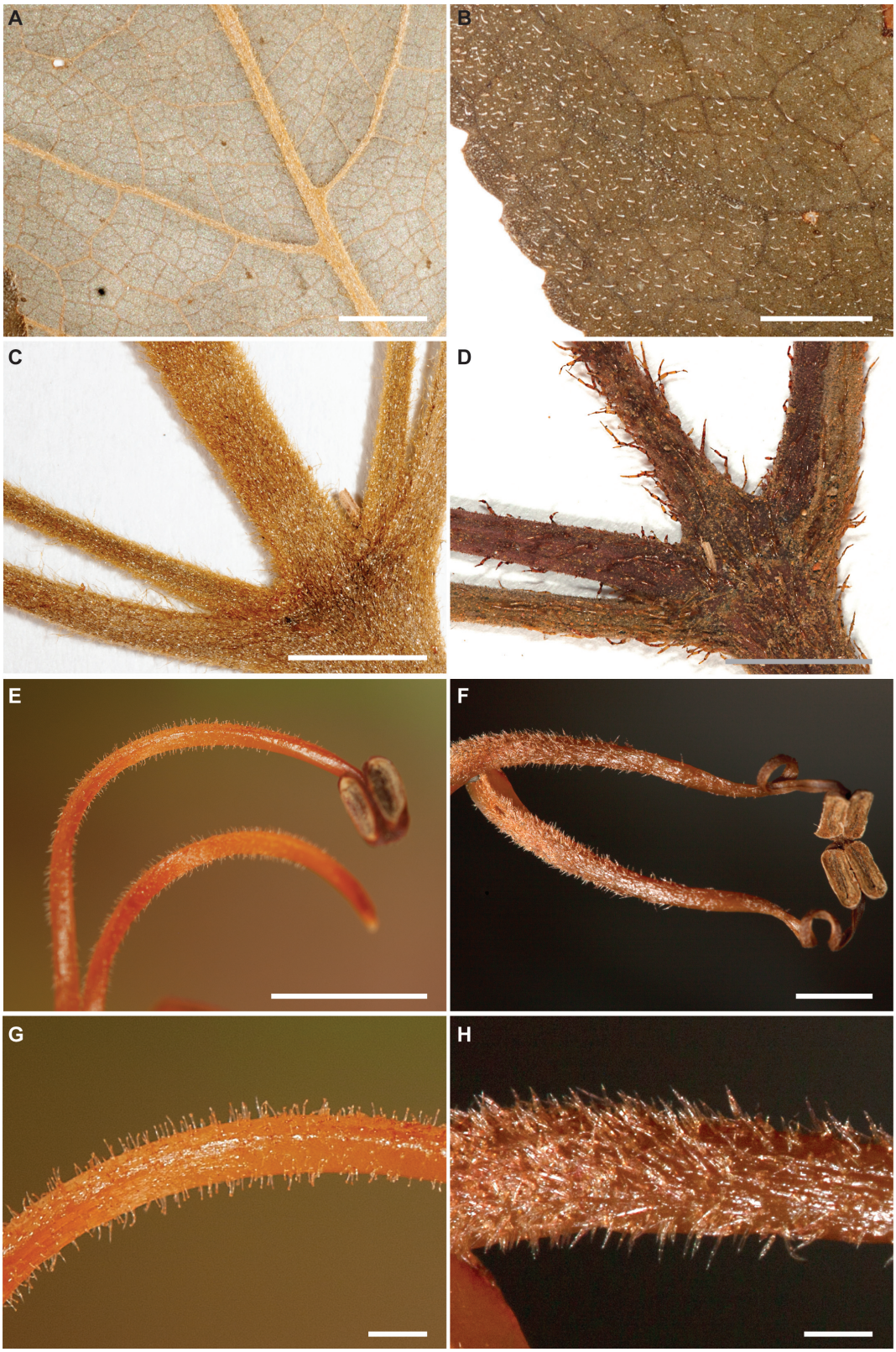

FIGURE 2. Indument of *Kohleria huilensis* Arango-Gómez, Clavijo & Zuluaga, *sp. nov.* (A-C, E, G) and *K. inaequalis* var. *inaequalis* (D, F, H) from dried specimens. **A.** Lower leaf surface scarcely villous, showing the veins with a mixture of dense villous and sericeous indumenta, **B.** Upper leaf surface with strigose indument composed by trichomes of different lengths, **C.** Stem, petiole and peduncle with a mixture of sericeous brownish and scarce villous indumenta, **D.** Stem, petiole and peduncle with reddish pilose indument (note the long trichomes), **E.** Filaments of *Kohleria huilensis* showing the hirsute indument with glandular trichomes on the apical half, **F.** Filaments of *Kohleria inaequalis* showing the lack of glandular trichomes, **G.** Apical half of the filaments showing the glandular trichomes in *Kohleria huilensis*, **H.** Basal half of the filaments showing the hirsute indument and the lacking of glandular trichomes in *Kohleria inaequalis*. Scale bar in A–F = 5 mm, G–H = 1 mm. (A–C, E and G from the holotype; D, F and H from *A. Zuluaga 2313*; Photos by A. Zuluaga).

Distribution and habitat:—*Kohleria huilensis* is endemic to Colombia in the departments of Huila and Cauca (near the Huila-Cauca border). It has been collected on the eastern slopes of the Central Cordillera and the western slopes of the Eastern Cordillera, above 1850 m of elevation. Most of the collections are from the Merenberg Natural Reserve (La Plata, Huila), with some populations from the Popayán-La Plata Road, near Moscopan (Santa Leticia, Puracé, Cauca), El Dorado Regional Natural Park in Oporapa (Huila) and the western slopes of the Eastern Cordillera, near the border between Huila and Caquetá (Fig. 3). This species grows in shaded areas inside Tropical Montane Forest.

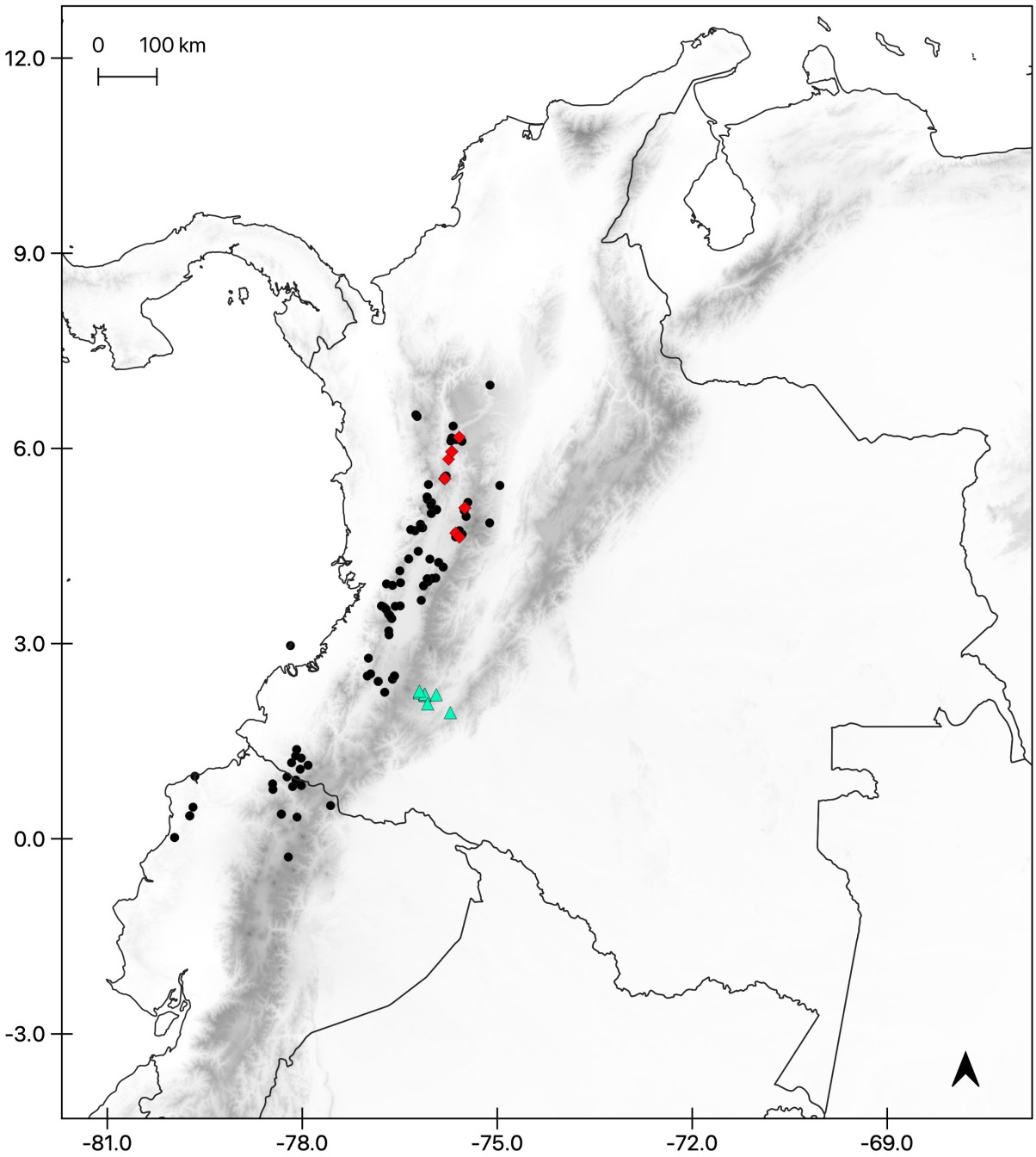

FIGURE 3. Distribution of *Kohleria huilensis* (cyan triangles) and the two more similar varieties of *K. inaequalis, K. inaequalis* var. *inaequalis* (black circles) and *K. inaequalis* var. *ocellata* (red rhombuses).

Phenology:—*Kohleria huilensis* has been recorded with flowers in March, April, June through September and December; and with fruits from March to April.

Etymology:—The specific epithet refers to the Huila department in Colombia, the type locality and where the majority of the populations are located.

Additional specimens examined (paratypes):—COLOMBIA. Cauca: Carretera a La Plata, región de Moscopán, Santa Leticia, 2230 m, 21 July 1948 (fl), *H. Garcia-Barriga & J.G. Hawkes 12870* (COL!, US!). Huila: Nebelwald am Pass Gabinete bei Resina, Ostcordillere, 2100 m, 12 June 1956 (fl), *St. Vogel 205* (US!); east slope of Cordillera Central, finca Meherenberg, Km 101 of La Plata-Popayan road, 13 km E of Sta. Leticia, 2300 m, ca. 2°15' N, 76°12' W, 24 March 1986 (bud), *B.A. Stein 3734* (COL!); finca Merenberg E. of Volcán Puracé, near Cauca border, mature forest remnants, 2300 m, 2°16' N, 76°12' W, 4 April 1986 (fl), *A.H. Gentry 53986* (CUVC!, US!); Belén, finca Merenberg, en bosque de *Quercus* sp., 2400 m, September 1980 (bud), *O. Rangel 2446* (COL!); bosque frente a la finca Merenberg, 2400 m, September 1980 (fl), *O. Rangel 2475* (COL!); Municipio de La Argentina, Vda. El Progreso, finca Buenavista, 20 m abajo de la casa de don Constantino Gómez, 1850 m, 2°12'44'' N, 76°56'23.1'' W, 9 March 2005 (fr), *G.A. Silva et al. GAS0106* (COL!); Municipio La Plata, vereda Agua Bonita, finca Merenberg, 2300 m, 21 July 1975 (fl), *S. Díaz P.; G. Lozano C. & J.H. Torres R. 794* (COL!); vereda Agua Bonita, finca Meremberg, 2300 m, 31 December 1977 (fl), *Polania 27* (COL!).

Discussion:—Collections of *Kohleria huilensis* had been misidentified as *K. inaequalis* var. *inaequalis* and *K. inaequalis* var. *ocellata*, which is not surprising considering that throughout the history of the genus, *K. inaequalis* has had a broad range of taxonomic circumscriptions given its wide morphological variation and the apparent high rates of hybridization (Kvist & Skog 1992). This has led to the inclusion of many morphotypes into the *K. inaequalis* complex that are not conspecific with the original description of the species. The broad circumscription of this taxon by Kvist & Skog (1992) is exemplified by five heterotypic synonyms that are under current revision (Arango *et al.* 2019).

Kohleria huilensis is often confused with the *Kohleria inaequalis* complex due to the following similarities: herbs to subshrubs, shorter than 1 m tall, blades lanceolate to ovate with crenate margin, and corolla limb wide with a conspicuous pattern of dark lines and spots. However, *Kohleria huilensis* differs by the mixture of white sericeous and sparse villous indumenta on the vegetative structures (*vs*. the combination of usually reddish villous and scabrid indumenta), the calyx lobes elongate with revolute margins (*vs.* lanceolate-ovate), the corolla magenta to fuchsia outside (*vs.* red), with the ventral lobe with truncate apex (*vs.* rounded), the filaments with glandular trichomes (*vs.* without glandular trichomes), and a staminode 2.2–2.8 mm long (*vs.* >2.8 mm long).

Kohleria inaequalis var. *lindenii* (Hanstein, 1859: 516-17, 557) L.P.Kvist & L.E.Skog (1992: 54) is readily differentiated from *Kohleria huilensis* by the ovate calyx lobes, 12.0–16.7 × 5.6–7.3 mm (*vs.* elongate with revolute margins, 7.5–11.6 × 1.4–3.1 mm) and the larger corolla tube (31.4–39.5 mm long *vs.* 16.8–23.6 mm long). In addition, although *K. inaequalis* var. *lindenii* and *K. huilensis* are distributed in Colombia, their geographical ranges do not overlap; the former is found in the departments of Antioquia and Tolima, while the latter is distributed in Huila and Cauca.

Distinguishing *Kohleria huilensis* (Fig. 1A, 1B, 1C, 1F) from the other two varieties, *K. inaequalis* var. *inaequalis* (Fig. 1E, 1H, 1K) and *K. inaequalis* var. *ocellata* (Fig. 1D, 1G), is summarized in Table 1 and Figure 2. *Kohleria huilensis* differs from *K. inaequalis* var. *inaequalis* by the trichomes on the stems shorter than 1.9 mm long (*vs.* up to 5.2 mm long), the calyx lobes elongate, 7.5–11.6 × 1.4–3.1 mm (*vs.* lanceolate, 5.3–13.5 × 1.6–6.3 mm), the corolla 21.4–25.3 mm long (*vs.* 25.7–42.3 mm long) and the limb 19.6–24.7 mm diameter (*vs.* 15.5–42.5 mm diameter). *Kohleria huilensis* differs from *K. inaequalis* var. *ocellata* by the larger corolla (21.4–25.3 mm long *vs.* 19.6–22.1 mm long), the larger limb (19.6–24.7 mm diam. *vs.* 14.4–18.3 mm diam.) and the presence of five free nectary glands (*vs.* three free and two basally fused nectary glands). Geographically, *Kohleria huilensis* is restricted to southwestern Colombia (Cauca and Huila departments), *K. inaequalis* var. *ocellata* is distributed toward the northern edge of the Cauca River valley (Antioquia, Caldas, Quindío and Risaralda departments), and *K. inaequalis* var. *inaequalis* is widely distributed in the Western Cordillera, the western slope of the Central Cordillera and the Cauca River valley in Colombia, and northern Ecuador (Fig. 3).

Kohleria huilensis could also be confused with a fourth morphotype within the *K. inaequalis* complex (Fig. 1I, 1J), that is only known from the Natural Reserve Cerro El Inglés, located in the Western Cordillera, in the border between Valle del Cauca and Choco departments. This morphotype was misidentified as *K. inaequalis* var. *lindenii*, but after examining and comparing it with the type collections of this variety, we conclude that although it is similar to *K. inaequalis*, it does not fit any of the three described varieties. Currently available information is not enough to describe it as a separate taxon. *Kohleria huilensis* and this morphotype have similar calyx lobes shape and size (7.5–11.6 × 1.4–3.1 mm in *K. huilensis vs.* 8.5–11.9 × 1.2–3.3 mm). However, *Kohleria huilensis* differs by the shorter corolla tube (16.8–23.6 mm long *vs.* 28.5–35.1 mm long), corolla lobes that are white-pink with magenta lines and spots (*vs.* uniformly red), and the ventral lobe 8.0–8.9 × 6.6–8.3 mm, with truncate apex (*vs.* 4.0–4.3 × 3.9–4.0 mm, with rounded apex).

TABLE 1. Morphological comparison of *Kohleria huilensis*, *K. inaequalis* var. *inaequalis* and *K. inaequalis* var. *ocellata*

Character	Species/variety		
	K. huilensis	***K. inaequalis* var. *inaequalis***	***K. inaequalis* var. *ocellata***
Indument color when live	Whitish	Usually red	Red
Stem trichomes length	0.7–1.9 mm	0.9–5.2 mm	0.8–1.8 mm
Indument on adaxial surface of leaves	Strigose, with trichomes of different lengths	Strigose, with trichomes of different lengths, sometimes scabrous	Usually scabrous, with small protrusions
Calyx lobes shape	Elongate with revolute margins	Lanceolate, rarely triangular	Lanceolate to ensiform, sometimes slightly ovate
Calyx lobes size	7.5–11.6 × 1.4–3.1 mm	5.3–13.5 × 1.6–6.3 mm	5.0–9.4 × 1.2–3.4 mm
Corolla shape	Tubular, ampliate toward the throat and sub-ventricose ventrally	Tubular	Campanulate or broadly tubular
Corolla length	21.4–25.3 mm	25.7–42.3 mm	19.6–22.1 mm
Corolla tube size	16.8–23.6 × 6.6– 13.2 mm	16.4–38.0 × 5.2– 14.8 mm	11.3–20.3 × 4.9–9.9 mm
Corolla tube color outside	Magenta to fuchsia	Red	Red, sometimes fuchsia
Limb diameter	19.6–24.7 mm	15.5–42.5 mm	14.4–18.3 mm
Corolla lobes color	White-pink with magenta lines and spots	Red with dark red-brown lines and spots	Red with dark purple lines and spots surrounded by a patch of white-pink
Indument on corolla lobes adaxially	Glandular on the basal half, towards the throat	Glabrous, glandular only on the throat	Glabrous, glandular only on the throat
Ventral lobe size	8.0–8.9 × 6.6–8.3 mm	(5.9–)6.9–15.6 × (4.0–)5.0–13.3 mm	4.6–7.2 × 4.4–6.7 mm
Ventral lobe apex	Truncate	Rounded	Rounded
Filaments indument	Hirsute with glandular trichomes on the apical half	Hirsute basally	Hirsute
Staminode length	2.3–2.8 mm	3.2–5.7 mm	3.5–4.4 mm

Acknowledgments

We thank the owners of the Merenberg Natural Reserve, especially Svanhild Büch, for facilitating the field expedition to the reserve that allowed us to collect the new species; the herbarium of the Universidad del Valle (CUVC) and the Colombian National Herbarium (COL) for granting us access to their collections; John L. Clark (The Lawrenceville School) for providing images of *Kohleria inaequalis* and helpful reviews to the manuscript; and an anonymous reviewer for providing important comments that helped improve this article.

References

Arango, K., Clavijo, L. & Zuluaga, A. (2019) *Taxonomía y delimitación de especies e híbridos en Kohleria (Gesneriaceae) con datos moleculares y morfometría*. Universidad del Valle, Cali, Colombia, 41 pp.

Bentham, G. (1846) *Plantae Hartwegianae*. W. Pamplin, London, 393 pp.

Carvajal, L.A., Rodríguez, R., Salazar, J.D., Martínez, M.F. & Losada, L.C. (2017) Natural Reserves of Civil Society as Strategic Ecosystems: Case Study Meremberg. *International Journal of Applied Environmental Sciences* 12 (6): 1203–1213.

Cavelier, J. & Etter, A. (1995) Deforestation of montane forests in Colombia as a result of illegal plantations of opium (*Papaver somniferum*). *In*: Churchill, S.P., Balslev, H., Forero, E. & Luteyn, J.L. (eds.) *Biodiversity and Conservation of Neotropical Montane Forests*. The New York Botanical Garden, New York, pp. 541–549.

Cavelier, J., Lizcaino, D. & Pulido, M.T. (2001) Colombia. *In*: Kappelle, M. & Brown, A.D. (Eds.) *Bosques Nublados del Neotrópico*. Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, pp. 443–496.

Clark, J.L. & Jost, L. (2021) New circumscriptions add two northern Andean species to *Kohleria* (Gesneriaceae). *PhytoKeys* 179: 99–110.
https://doi.org/10.3897/phytokeys.179.65990

Hanstein, J. (1859) Die Gesneriaceen des Königlichen Herbarium und der Gärten zu Berlin nebst monographicher Uebersicht der Familie im Ganze, II: Ganungen und Arten, 2: Die Brachylomateen. *Linnaea* 29: 497–592.

Hooker, W.J. (1848) *Achimenes ocellata*: Eyeletted *Achimenes*. *Botanical Magazine* 73: plate 4359.

IDEAM (2017) *Resultados Monitoreo de la Deforestación 2017*. Instituto de Hidrología, Meteorología y Estudios Ambientales-IDEAM, Bogotá D.C., Colombia. Available from: http://www.ideam.gov.co/documents/24277/72115631/Actualizacion_cifras2017+FINAL.pdf/40bc4bb3-370c-4639-91ee-e4c6cea97a07 (Accessed July 2020)

Kattan, G. (2003) *Bosques Andinos y Subandinos del Departamento del Valle del Cauca*. Corporación Autónoma Regional del Valle del Cauca-CVC, Santiago de Cali, 67 pp.

Kvist, L. & Skog, L. (1992) Revision of *Kohleria* (Gesneriaceae). *Smithsonian Contributions to Botany* 79: 1–83.

Otto, F. & Dietrich, A. (1845) Mamillarien und Beschreibung der noch unbekannten Blumen von zwei Arten. *Allg. Gartenz* 30: 147.

Parques Nacionales Naturales de Colombia (2015) *Áreas protegidas: territorios para la vida y la paz, Tomo I. Áreas Protegidas para el desarrollo*. II Congreso Colombiano de Áreas Protegidas, Bogotá D.C., 425 pp.

Regel, E. (1847) Index seminum. *Horto botanico Turicensi* 1847: 1–4.

Roalson, E.H., Boggan, J.K. & Skog, L.E. (2005) Reorganization of Tribal and Generic Boundaries in the Gloxinieae (Gesneriaceae: Gesnerioideae) and the Description of a New Tribe in the Gesnerioideae, Sphaerorrhizeae. *Selbyana* 25 (2): 225–238.

Victorino, A. (comp.) (2012) *Bosques para las personas: Memorias del Año Internacional de los Bosques 2011*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt y Ministerio de Ambiente y Desarrollo Sostenible, Bogotá, D.C., 120 pp.

Weber, A., Clark, J.L. & Möller, M. (2013) A New Formal Classification of Gesneriaceae. *Selbyana* 31 (2): 68–94.

Wiehler, H. (1978) Miscellaneous Transfers and New Species of Neotropical Gesneriaceae. *Selbyana* 5: 61–93.