COLUMNEA PYGMAEA (GESNERIACEAE), A NEW SPECIES FROM NORTHWESTERN ECUADOR

John L. Clark

Department of Biological Sciences, Box 870345
The University of Alabama
Tuscaloosa, Alabama 35487, U.S.A.
jlc@ua.edu

James F. Smith

Department of Biology
Boise State University
1910 University Drive
Boise, Idaho 83725, U.S.A.

ABSTRACT

Recent expeditions to the northwestern slopes of the Ecuadorian Andes and revisionary work of *Columnea* (Gesneriaceae) have resulted in the discovery of a new plant species. The new species, **Columnea pygmaea,** is distinguished from other congeners by small flowers (< 1 cm), erect shoots, and an obligate epiphytic habit. A discussion that includes a dichotomous key and digital images is presented to provide a better understanding of and to differentiate *Columnea pygmaea* from *C. parviflora*, *C. herthae*, *C. minutiflora*, and *C. lehmannii*.

RESUMEN

Como resultado de las recientes expediciones al noroccidente de los Andes ecuatorianos y del trabajo de revisión del género *Columnea* (Gesneriaceae), se ha descubierto una nueva especie para la ciencia. La nueva especie, **Columnea pygmaea,** se distingue de sus congéneres por tener flores pequeñas (< 1 cm), vástagos erectos, y hábito holoepífito. Además de la descripción de la especie, se presenta una clave dicotómica e imágenes digitales para brindar un mejor entendimiento y diferenciación entre *Columnea pygmaea* de *C. parviflora*, *C. herthae*, *C. minutiflora* y *C. lehmannii*.

Key Words: *Columnea*, Gesneriaceae, Taxonomy, Flora of Ecuador

INTRODUCTION

The genus *Columnea* is primarily epiphytic and belongs to the New World subfamily Gesnerioideae. The genus ranges from Mexico south to Bolivia and is one of the largest genera of the family in the New World tropics with over 200 species. *Columnea* is distinguished from other closely related genera by the presence of an indehiscent berry instead of a fleshy bivalved capsule. *Columnea* is the most diverse genus in the subfamily Gesnerioideae with over 200 species (Skog & Boggan 2006; Weber 2004; Burtt & Wiehler 1995). The traditional sectional classification of *Columnea* does not represent monophyletic lineages (Smith 1994, Smith & Sytsma 1994; Clark et al. 2006) and a revised classification system based on molecular sequence data is currently in preparation by the authors. The species described here belongs to a well-supported clade (Smith et al., in review) that does not yet have a formal designation. Many of the specimens that resemble *Columnea pygmaea* J.L. Clark & J.F. Smith are incorrectly determined in herbaria. Plates of digital images and a key are provided to help differentiate *Columnea pygmaea* from the following morphologically similar species: *Columnea parviflora* C.V. Morton, *C. herthae* Mansf., *C. minutiflora* L.P. Kvist & L.E. Skog, and *C. lehmannii* Mansf.

TAXONOMIC TREATMENT

Columnea pygmaea J.L. Clark & J.F. Smith, sp. nov. (**Fig. 1**). Type: ECUADOR. Esmeraldas: Cantón San Lorenzo, remnant patch of forest along Highway Ibarra-San Lorenzo, between the towns of Durango and Alto Tambo, 1°01'22"N, 78°36'30"W, 460 m, 3 Jun 2009, *J.L. Clark & Gesneriad Research Expedition Participants 11180* (holotype: US; isotypes: BRIT, CAS, K, MO, NY, QCNE, SEL, UNA).

A *Columnea herthae* corollis minus quam 1 cm longis vice 2 cm, caulibus erectis vice pendentium differt.

Obligate epiphytic herb, roots fibrous, stems erect (not scandent), 7–20(–40) cm tall, sparsely villous throughout, internodes 1–4 cm long. **Leaves** opposite, subequal to strongly unequal in a pair; larger leaf with petioles 0.5–1.5 cm long, villous; blade elliptic to narrowly ovate, 2.0–7.0 × 1.5–3.5 cm, base asymmetrical, apex acute to obtuse, margin shallowly serrate to crenate; adaxially bright green, sparsely villous; abaxially

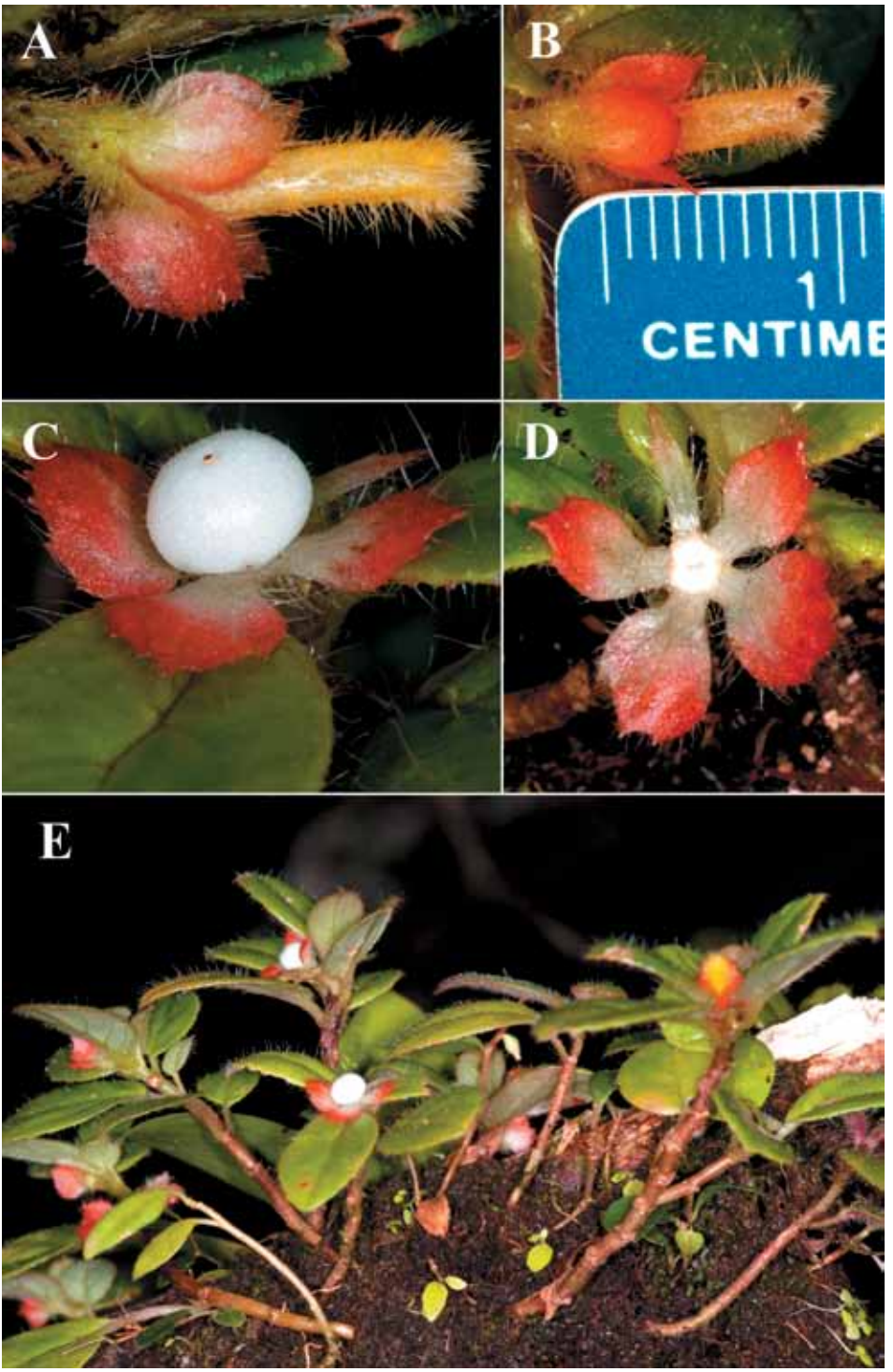

Fig. 1. *Columnea pygmaea*. **A & B.** Mature flower. **C.** Mature berry. **D.** Berry removed to show calyx. **E.** Habit (Photos by J.L. Clark from the field collection of the holotype, *J.L. Clark & The Gesneriad Research Expedition Participants 11180*).

greenish-white, sparsely to densely villous (especially on veins), 3–4 pairs of lateral veins; smaller leaf similar to larger leaf, but greatly reduced, 0.5–1.5 × 0.2–0.5 cm. **Inflorescence** reduced, epedunculate and appearing fasciculate with 1–3 flowers per node, bracts persistent, 0.2 × 0.1 cm, bright red; pedicel 0.3–0.5 cm long, villous to densely villous near base of calyx and red. **Calyx** bright red with reflexed red lobes at anthesis; lobes 5, nearly free; 4 lobes equal in size, ovate to broadly ovate, ca., 0.5 × 0.5 cm, margin with 3–5 serrations on each side, sparsely villous near apex and densely villous at base, inside sparsely villous, the fifth dorsal lobe smaller, lanceolate, 1.0 × 0.2 cm. **Corolla** pale yellow, tubular, 0.7–0.9 × 0.2–0.3 cm, corolla posture erect in calyx, lobes erect, white to pale-yellow, limb nearly actinomorphic, outside sparsely villous near base to densely villous near apex, inside glabrous. **Androecium** of 4 stamens, didynamous, included; staminode not observed. **Nectary** a single dorsal truncate gland. **Gynoecium** immature, ovary superior, ovoid. **Fruit** an indehiscent white berry, appearing dorsally flattened, 0.5 cm in diameter.

Distribution and habitat.—*Columnea pygmaea* is known from two collections from wet forests along the western slopes of the Ecuadorian Andes. The first collection of *Columnea pygmaea* was by Hans Wiehler and Calaway Dodson (*H. Wiehler & C.H. Dodson 7113*) from the province of Pichincha (Rio Baba, Hwy Santo Domingo-Quevedo). Additional collections since the early 1970s are from cultivated material that was distributed from Cornell University's L.H. Bailey Hortorium. The cultivated material apparently originated from Wiehler and Dodson's 1971 field collection.

The tropical wet and moist coastal forests of western Ecuador below 1000 meters once encompassed a band from Colombia to Peru that reached a maximum width near the northern limit and was very narrow and broken to the south. Dodson and Gentry (1991) estimated that while this forest type once covered 15% of western Ecuador, currently less than 0.8 % of the coastal wet and moist forests remain. It is not surprising that *Columnea pygmaea* has not been recollected since 1971 because of the near eradication of this forest type from western Ecuador. The endemism of the flowering plant family Gesneriaceae in western Ecuador is estimated at 20%, which is significantly higher than the 12% endemicity reported for western lowland Ecuador (defined as below 1000 m) as reported by Jørgenson and León-Yánez (1999) and Valencia et al. (2000). The endemicity of the Gesneriaceae in western Ecuador is especially important for evaluating conservation priorities because at least 20 of the 23+ species were evaluated and considered extinct or endangered by Kvist et al. (2004) according to the IUCN Red List categories (IUCN 2001).

Fieldwork in Ecuador with participants of the 2009 Gesneriaceae Research Expedition resulted in the discovery of a second population and extension of the species known range into the northern Ecuadorian province of Esmeraldas. The type locality of *Columnea pygmaea* is from a remnant patch of primary forest along the San Lorenzo-Ibarra highway between the towns of Alto Tambo and Durango at 460 m. It was noticed by the first author during extensive fieldwork between 2003 and 2009 that most of the forest along the San Lorenzo-Ibarra highway had been converted to African Palm plantations. The original habitat from this area is transitional between lowland and montane wet forest. These forests have been classified as *bosque siempreverde piemontano* (Sierra 1999); *selva ombrófila noroccidental del pie de cordillera* (Acosta Solis 1968); and *bosque lluvioso montano bajo* (Harling 1979).

Discussion of circumscription.—*Columnea pygmaea* is unique among the species of *Columnea* by the short corollas that are less than 1 cm in length (Fig. 1B). *Columnea parviflora* consistently has corollas that are less than 1 cm in length (Fig. 2A), but the habit and calyx margin help differentiate this species from *C. pygmaea*. The pendent and climbing habit of *C. parviflora* (Fig. 2E) helps differentiate it from the erect stems and non-climbing habit of *C. pygmaea* (Fig. 1E). The calyx lobes of *Columnea parviflora* are fimbriate (Fig. 2C–D) in contrast to the shallow serrations in *C. pygmaea* (Fig. 1D). Both *Columnea pygmaea* and *C. herthae* have uniformly pale-yellow tubular corollas with four equal calyx lobes and one (dorsal) lobe that is reduced and lanceolate (Fig. 1D & Fig. 3C). In contrast to four equal calyx lobes with one reduced calyx lobe, *Columnea minutiflora* (Fig. 4) and *C. parviflora* (Fig. 2) have five calyx lobes that are nearly equal in size and shape.

The above three species are common in northwestern Ecuador and southern Colombia. In contrast,

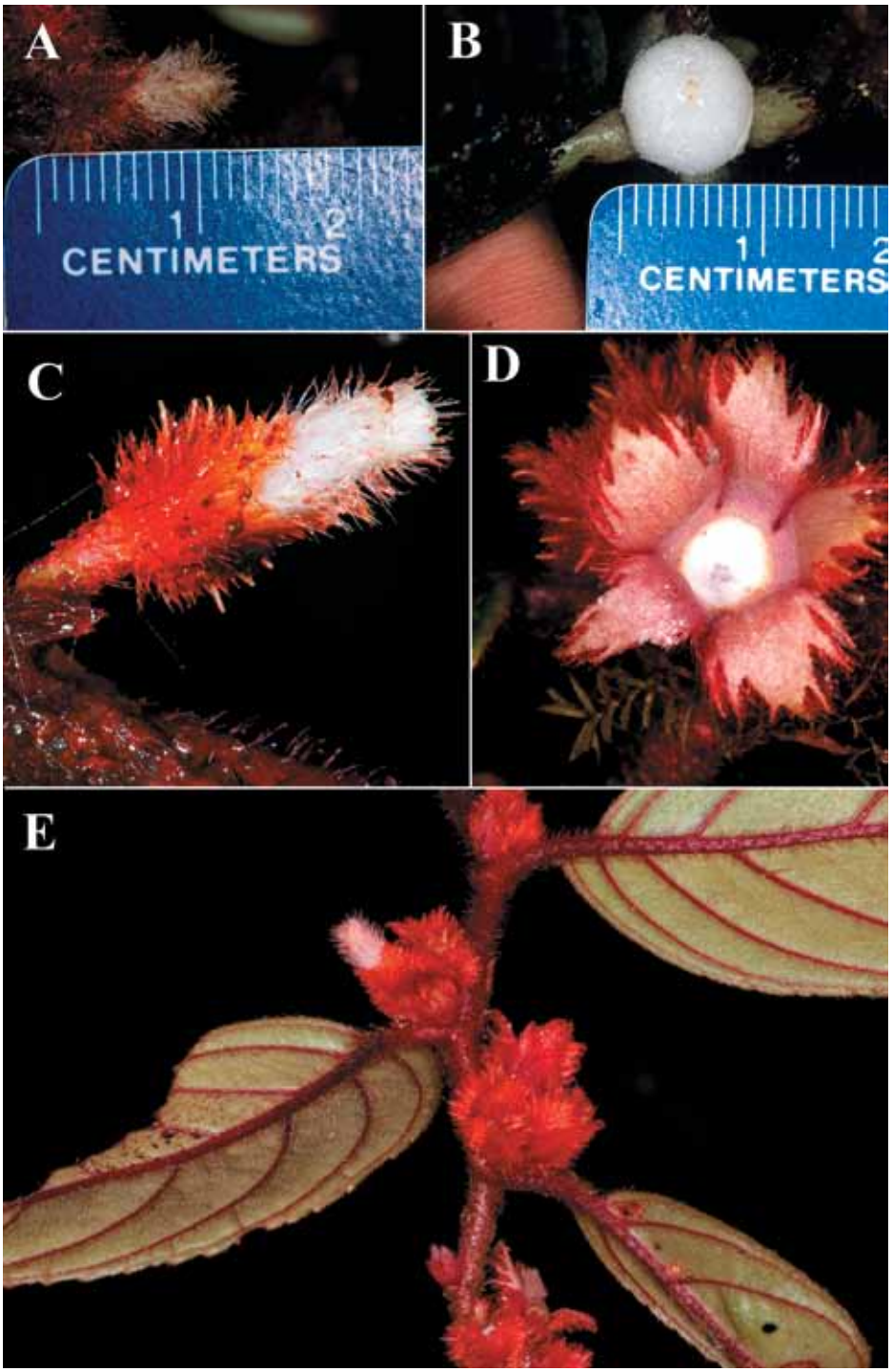

Fig. 2. *Columnea parviflora*. **A.** Mature flower. **B.** Mature berry. **C.** Mature flower. **D.** Berry removed to show calyx. E. Habit (Photos by J.L. Clark, A & B *J.L. Clark, R. Fleiss & I. Salinas 8817*, C. *J.L. Clark & The University of Alabama in Ecuador Program Participants 9644*, D & E. *J.L. Clark & The University of Alabama in Ecuador Program Participants 10832*).

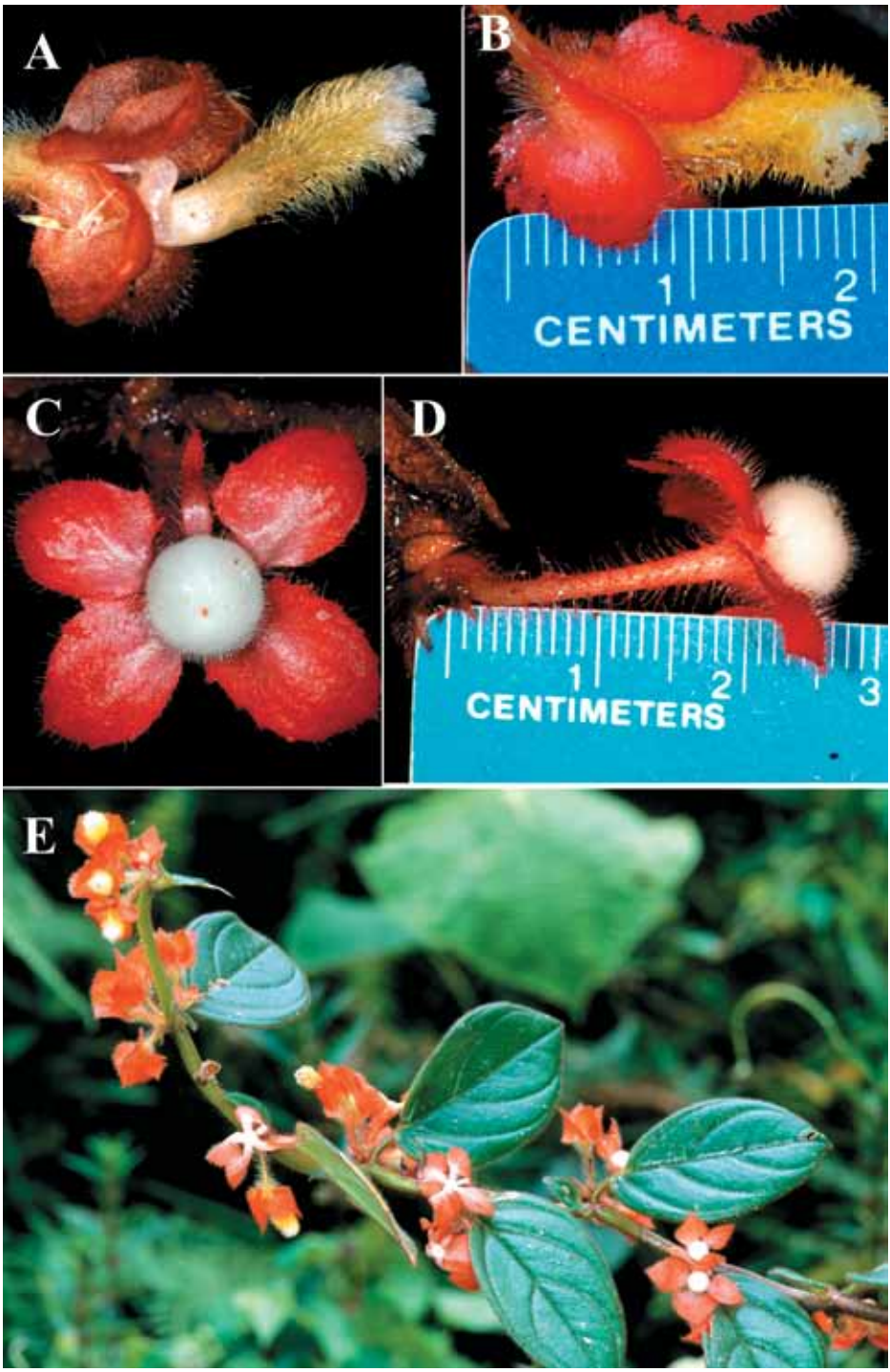

Fig. 3. **Columnea herthae. A & B.** Mature flower. **C & D.** Mature berry. **E.** Habit (Photos by J.L. Clark, A, B & E, J.L. Clark, G. Zapata & G. Toasa 7113, C & D. *J.L. Clark & The Gesneriad Research Expedition Participants 11193*).

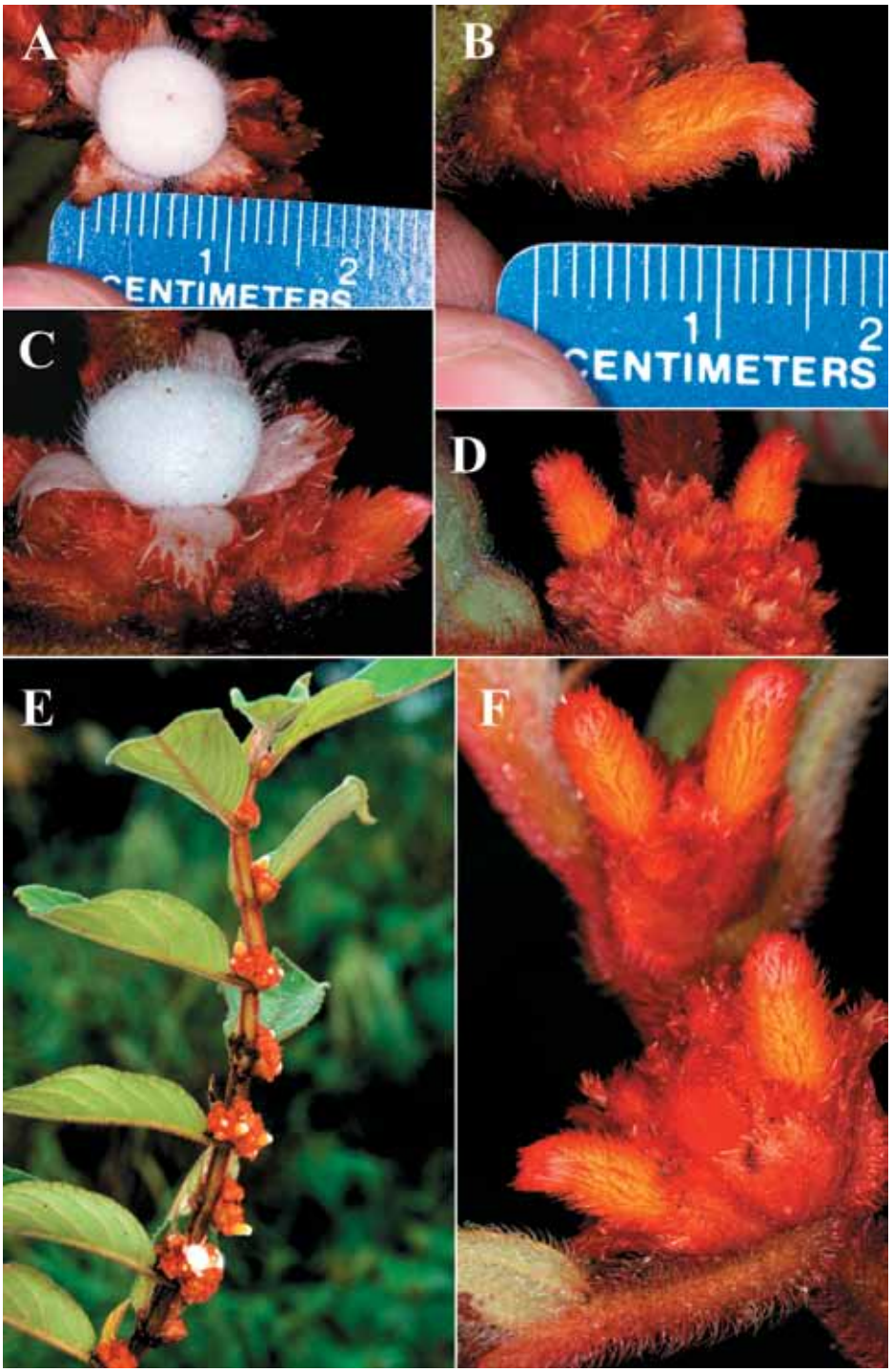

Fig. 4. *Columnea minutiflora*. **A.** Dorsal view of mature berry. **B.** Mature flower. **C.** Lateral view of mature berry. **D.** Inflorescence. **E.** Habit. **F.** Inflorescence (Photos by J.L. Clark, A, *J.L. Clark 7092*, B. & D. *J.L. Clark & The Gesneriad Research Expedition Participants 11091*, C. & F. *J.L. Clark & The Gesneriad Research Expedition Participants 11132*, E. *J.L. Clark 7200*).

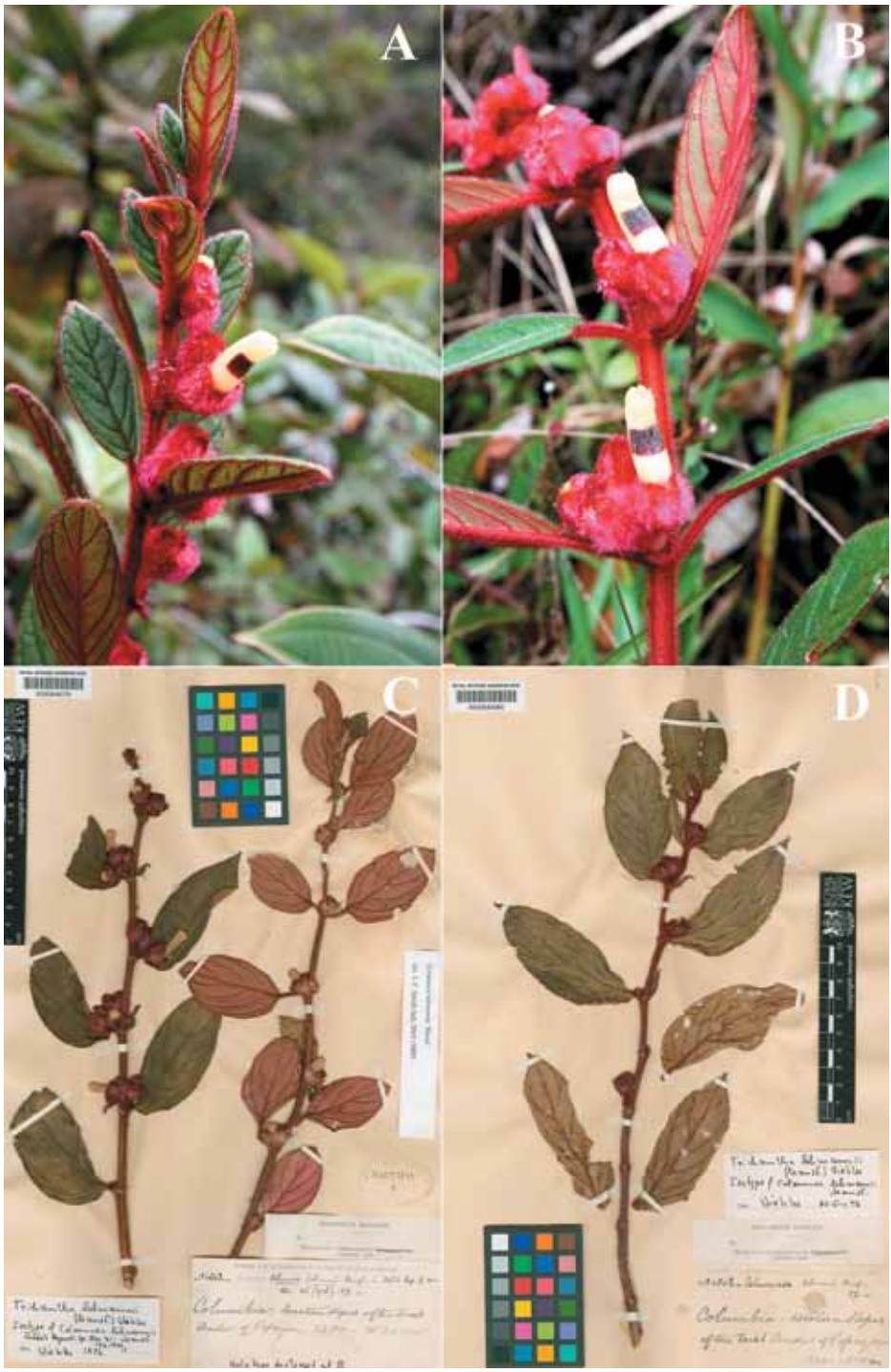

Fig. 5. *Columnea lehmannii*. **A. & B.** Habit with erect inflorescence. **C.** Lectotype of *C. lehmannii*, *F. Lehmann 6063* (K). **D.** Isolectotype of *C. lehmannii*, *F. Lehmann 6063* (K). (Photos A & B. by J. Betancur of *J. Betancur et al. 12359* from the Parque Nacional Tatamá, C. & D. Specimens from the Royal Botanic Gardens, Kew).

Columnea lehmannii is common in Colombia, but is known from Ecuador by a single collection (*Kvist et al. 48983*, AAU), which has not been seen by the authors of this study. Confusion between *Columnea lehmannii* and other species discussed here is evident from many misidentified collections at MO, NY, QCA, QCNE, SEL, and US. Many herbarium collections previously identified as *Columnea lehmannii* clearly belong to *Columnea herthae* (e.g., the 25+ collections made and distributed by the first author to numerous herbaria). *Columnea lehmannii* is differentiated by the presence of larger corollas (> 2 cm long; Fig. 5 A & B). The presence of opposite leaves that are nearly equal in size is rare in other species and relatively common in *C. lehmannii* (Fig. 5), but occasionally the opposite leaves are strongly anisophyllous (Fig. 5 D).

Etymology.—The new species is named in reference to the small stature of the plants. The flowers of *Columnea pygmaea* (Fig. 1B) are similar in shape to *Columnea herthae* (Fig. 3B), but differ by their significantly smaller size.

Conservation and IUCN Red List category.—*Columnea pygmaea* has not been found in any formally protected area in Ecuador. According to the IUCN Red List criteria (IUCN 2001) for limited geographic range (B2a, less than 10 km^2 and known to exist at only a single location) and considering the uncertain future of habitat conservation along the San Lorenzo-Ibarra highway, *Columnea pygmaea* should be listed in the category CR (Critically Endangered).

Paratypes.—**ECUADOR. Pichincha:** Rio Baba (=Rio Quevedo, Rio Palenque), km 7 on road from Santa Domingo to Quevedo, 21 Jul 1971, *H. Wiehler & C.H. Dodson 7113* (=Wiehler live accession W-1573) (US); cultivated collection from L.H. Bailey Hortorium of *H. Wiehler & C.H. Dodson 7113*, 7 Jan 1975, *M.H. Stone 1305* (SRP, US).

KEY TO THE COMMON SPECIES OF *COLUMNEA* WITH CRENATE-MARGINED OBLONG LEAVES

1. Calyx margins deeply fimbriate ____ **Columnea parviflora**
1. Calyx margins serrate to entire
   2. Reduced inflorescence of 1–3 flowers with well-developed pedicels
      3. Corolla less than 1 cm long, stems less than 40 cm tall ____ **Columnea pygmaea**
      3. Corolla 1.5 – 2.0 cm long, stems more than 40 cm tall ____ **Columnea herthae**
   2. Reduced inflorescence of 4–6 flowers with each flower appearing sessile
      4. Corolla 1–1.5 cm long, corolla uniformly colored and lacking markings ____ **Columnea minutiflora**
      4. Corolla 2.0 to 4 cm long, corolla not uniformly colored, tube with broad red band on ventral surface ____ **Columnea lehmannii**

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