



## ***Croton condorensis*: an enigmatic new species of Euphorbiaceae from southern Ecuador**

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### **Abstract**

*Croton condorensis* (Euphorbiaceae), a new species from the Cordillera del Cóndor in southern Ecuador, is here described and illustrated. The new species occurs in sclerophyllous vegetation on sandstone substrate. A detailed examination of its morphology indicates that the species has some characters in common with *Croton* sect. *Cyclostigma*, but it also differs from that section in several other key characters. Given its restricted geographic distribution, the particular substrate where it grows, and its unusual morphology, we hypothesize that *Croton condorensis* might represent a previously unsampled clade of the *Croton* phylogeny.

### **Resumen**

Se describe e ilustra *Croton condorensis* (Euphorbiaceae), una nueva especie de la Cordillera del Cóndor en el sur de Ecuador. Esta especie se encuentra en vegetación esclerófila sobre substrato de arenisca. Una examinación detallada de su morfología indica que la especie comparte algunos caracteres morfológicos con miembros de *Croton* sect. *Cyclostigma*, pero también posee caracteres clave que no son compatibles con la morfología de dicha sección. Dada su restringida distribución geográfica, el particular substrato en el que crece, y la falta de afinidades morfológicas evidentes con alguna de las secciones de *Croton*, planteamos la hipótesis de que *Croton condorensis* podría representar un clado de la filogenia del género aún no muestreado.

### **Introduction**

The Catalogue of the vascular plants of Ecuador (Jørgensen & León-Yáñez 1999) lists 39 species of *Croton* Linnaeus (1753: 1004), 13 of which appear to be endemic to the country (Cerón *et al.* 2011). After the publication of the catalogue, there have been several updates on Ecuadorian *Croton*, such as changes in name status, new records for the country, and recently described species (Smith 2006, Riina *et al.* 2007, Riina & Berry 2010). The taxonomic knowledge of New World *Croton* has improved significantly with the establishment of a new classification based on a phylogenetic framework, taking into account molecular, morphological and geographic information (van Ee *et al.* 2011). This classification substitutes the previous one that was based solely on morphology (Webster 1993). With approximately 1200 species, *Croton* is so diverse that new species continue to be described, and thus unsampled clades (sections) are likely to be detected in future phylogenetic analyses.

The new species, *Croton condorensis*, adds to an increasing list of plant species described in recent years from the Cordillera del Cóndor (Rogers 2002, Ulloa & Neill 2006, Clark *et al.* 2010, Jara-Muñoz 2011, Neill & Asanza 2012, Neill *et al.* 2012). The Cordillera del Cóndor is a highly diverse and isolated sandstone mountain range located in southern Ecuador, along the border with Peru (Schulenberg & Awbrey 1997, Neill 2005). It runs north-south for about 150 km east of the main Andean chain and reaches a maximum elevation of around 2900 m (Rodríguez *et al.* 2006). We describe and illustrate *Croton condorensis*, a small tree growing in open sclerophyllous vegetation on the Ecuadorian side of the Cordillera del Condor.

## Taxonomy

### *Croton condorensis* Riina & Cerón, *sp. nov.* (Fig. 1)

The new species is similar to members of sect. *Cyclostigma* but it differs from these species in its narrowly ovate leaves, smooth seeds, and the lack of colored latex.

**Type:**—ECUADOR. Zamora-Chinchipe: Cantón Yantzaza, Parroquia las Peñas, Kinross Aurelian, Cordillera del Cóndor, Sector Frutos del Norte, cumbre de colina en la cuenca del río Machinaza, 03°46.27'S, 78°29.12'W, 1600 m, 1 November 2011, fl., *C.E. Cerón, C.I. Reyes, P. Gamboa, A. Imaysela & F. Libiapoma 70424* (holotype QAP!, isotypes COL!, MA!, MICH!, QCNE!).

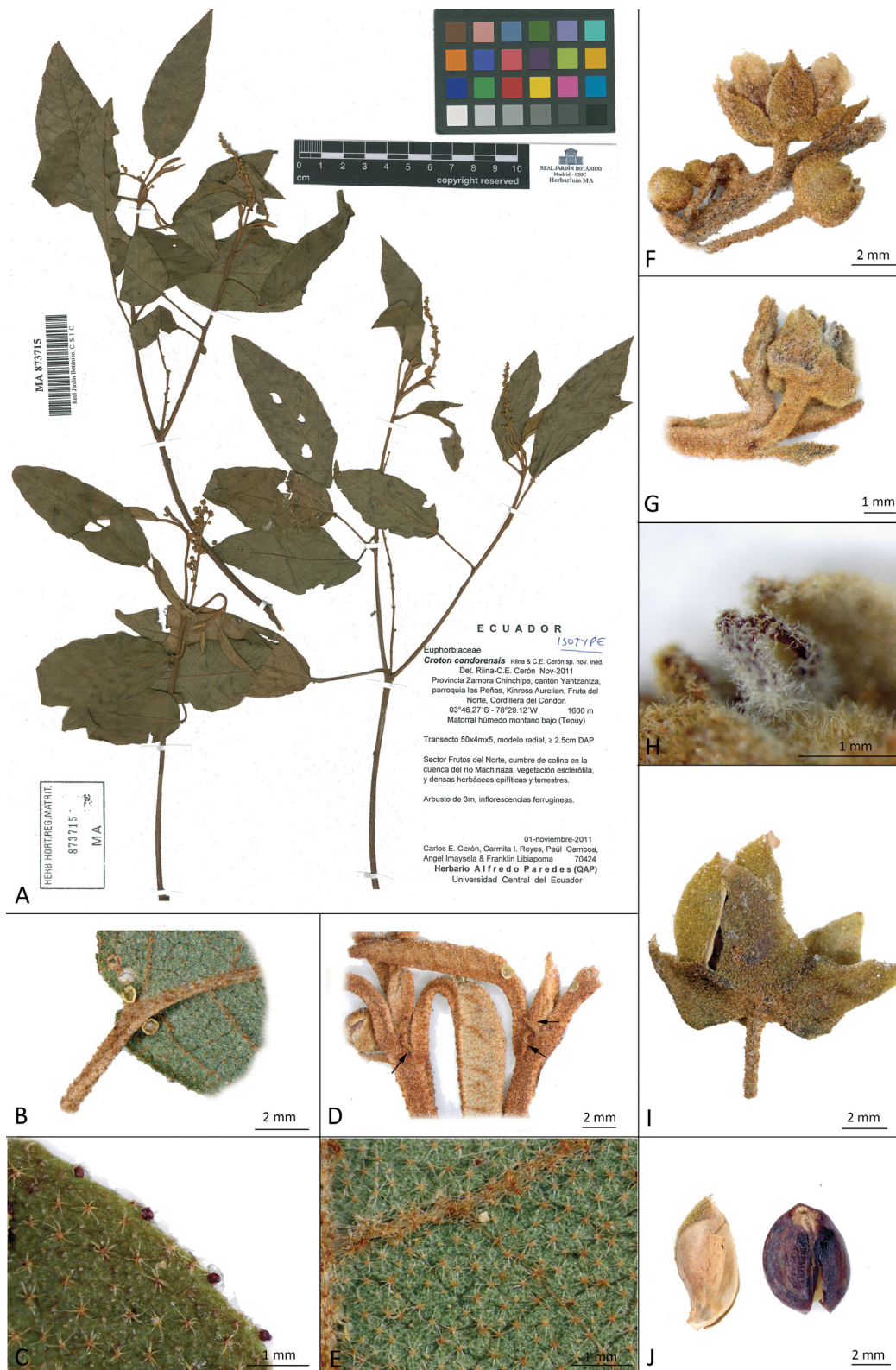
Monoecious shrubs or small trees 2–5 m high, ca. 5–6 cm DBH; young branches with a dense ferruginous indumentum of stellate trichomes; bark of old branches smooth, brown-ferruginous; latex not evident. Stipules linear, 1.5–2 mm long, with stellate trichomes, one ovoid colletter at the apex, sometimes with colleters along the margins. Petiole 1–3 cm × 1 mm, with a dense indumentum of stellate trichomes; petiolar glands 2–4, patelliform, margins usually undulate, acropetiolar, subsessile to shortly stipitate, attached to the petiole on the abaxial surface. Leaf blade narrowly ovate to lanceolate, 5–11 × 2.3–4.5 cm; adaxial surface with scattered stellate trichomes; abaxial surface with a dense indumentum of stellate trichomes; apex acute to slightly acuminate; base rounded to cordate; margin slightly dentate with numerous ovoid colleters (no longer functional) at the tip of the teeth; venation pinnate, secondary veins in 9–12 pairs, brochidodromous, raised on both surfaces, veinlets visible. Inflorescences usually terminal, sometimes axillary, nodding, 2–12 cm long, axis costate, with a dense indumentum of stellate trichomes; lower cymules bisexual, unisexual cymules with staminate flowers regularly spaced along the axis; bracts triangular, ca. 1 × 0.5 mm. Staminate flowers pedicellate, pedicel 1–6 mm long; sepals 5, ovate with acuminate apex, 3–4 × 1.5–2 mm, adaxial surface with scattered simple trichomes, abaxial surface with a dense indumentum of stellate trichomes, margin with simple trichomes; petals obovate, 3–4 × 1.8–2.2 mm, with scattered simple trichomes on both surfaces and along the margin; receptacle densely covered by simple trichomes; stamens (20)30–35(40); filaments 1–2 mm long, pilose, anthers 0.8–1 × 0.4–0.6 mm. Pistillate flowers pedicellate; pedicel 5–25 mm long; sepals 5, triangular-lanceolate, valvate, sometimes slightly imbricate at the base in young flowers, persistent, 5–8 × 3–4 mm, adaxial surface with scattered simple trichomes, abaxial surface with scattered stellate trichomes, margin pilose; petals absent; ovary densely covered with stellate-porrect trichomes; styles bifid from near the base (6 terminal tips), 1.5–2 mm long, covered with simple trichomes. Fruits subglobose, slightly trilobed, 7–10 × 6–8 mm, densely covered with stellate trichomes; columella 5–7 mm long, tip truncate, without conspicuous lobes. Seeds ovoid, smooth, shiny, dark brown or marbled, 6–7 × 4–5 mm, caruncle inconspicuous, 0.3–0.4 × 0.5–0.6 mm.

**Distribution and habitat:**—This species appears to be restricted to the Ecuadorian side of the sandstone plateaus of the Cordillera del Cóndor in the province of Zamora-Chinchipe (Fig. 2). It occurs in sclerophyllous shrubby vegetation in 1600–1900 m of elevation.

**Common name:**—Uruchmas (Shuar).

**Additional specimens (paratypes) examined:**—ECUADOR. Zamora Chinchipe: Cantón Yantzaza, Parroquia las Peñas, Kinross Aurelian, Fruta del Norte, Cordillera del Cóndor, sector sobre la Antena, cuchilla bajo la colina, cuenca del río Machinaza, 03°47.57'S, 78°28.56'W, 1900 m, 2 November 2011, fl., *C.E. Cerón, C.I. Reyes, P. Gamboa, A. Imaysela & F. Libiapoma 70489* (MO!, QCNE!, QAP!); sector sobre el cerro Colibrí, margen derecha aguas arriba del río Machinaza, 03°45.13'S, 78°30.23'W, 1630 m, 3 November 2011, fl., *C.E. Cerón, C.I. Reyes, P. Gamboa, A. Imaysela & F. Libiapoma 70663* (QAP!, QCA!); Cantón Yacuambi, Parroquia la Paz, centro Shuar Washikiat, reserva Micha Nunka, el Mirador, 03°43.59'S, 78°54.59'W, 1620 m, 2 May 2007, fr., *C. Kajekai & A. Wisum 1258* (MO!, QCNE!); Cantón el Pangui, Cordillera del Cóndor, Sandstone Plateau of Contrafuerte Tres Patines, west of main Cóndor ridge, above "Jardín Botánico" of Ecuacorriente copper company, south of km 15 of Cóndor Mirador military road, 03°37.48'S, 78°26.50'W, 1685 m, 9 December 2005, fl., *D. Neill & W. Quizhpe 15057* (MICH!, MO!, QCNE!).

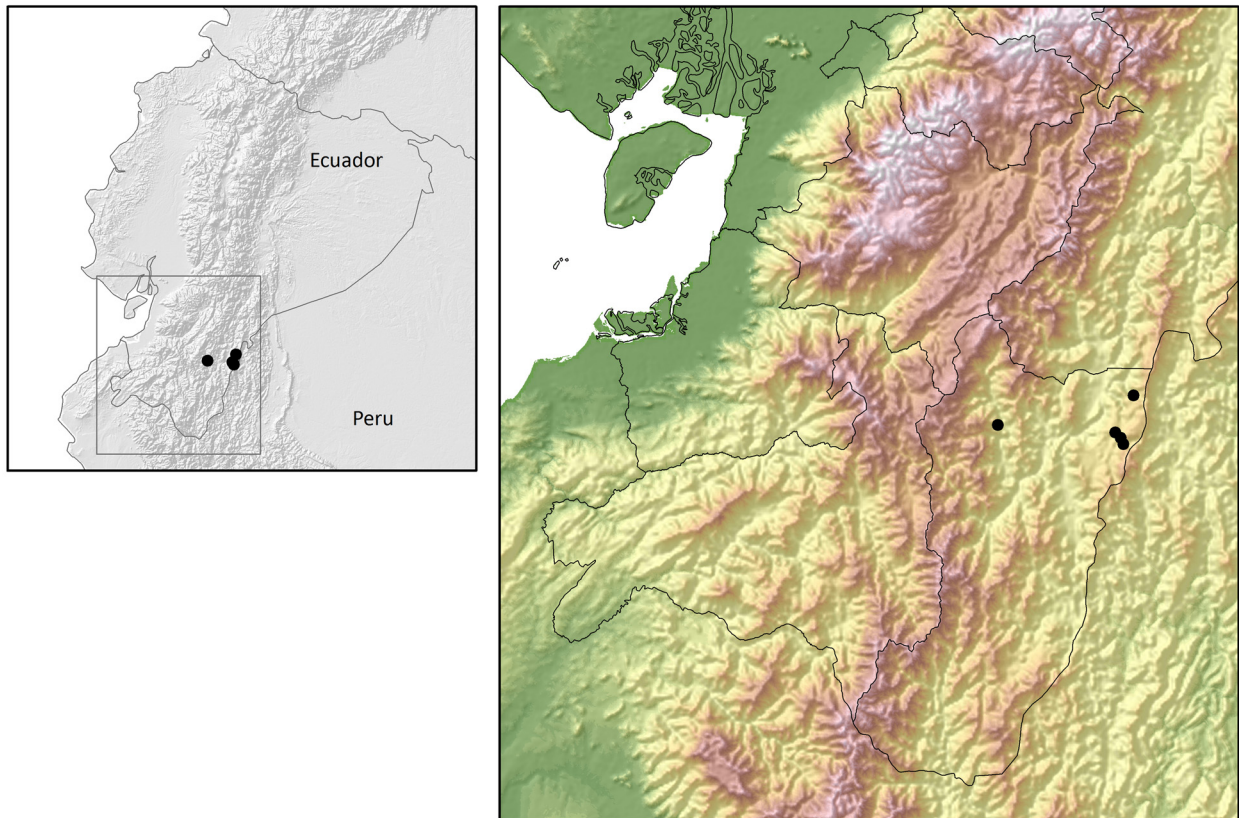
**Discussion:**—*Croton condorensis* shows no clear affinity to any of the *Croton* sections established by van Ee *et al.* (2011), although the species shares several characters with members of sect. *Cyclostigma* Grisebach (1859: 42), as suggested by the sectional identification key of van Ee *et al.* (2011), namely: habit (shrub to small tree), stellate indumentum, presence of petiolar glands, leaf blade without marginal glands, bisexual cymules on the lower section of the inflorescence, and numerous stamens. Conversely, latex is abundant and usually showy (yellow, orange or reddish) in members of sect. *Cyclostigma* (Riina *et al.* 2009), but it is not evident in *Croton*



**FIGURE 1.** *Croton condorensis*. A) Image of isotype showing a flowering branch; B) Petiolar glands visible from the abaxial side; C) Adaxial side of the leaf with old colleters along the margin; D) Apical part of a branch showing the stipules; E) Indumentum on the abaxial side of the leaf; F) Detail of staminate flower; G) Fragment of pistillate flower; H) Detail of the styles covered with trichomes; I) Persistent calyx after fruit dehiscence; J) Part of fruit (after dehiscence) and seed. Vouchers: A: *Cerón et al.* 70424 (MA); B–J: *Cerón et al.* 70424 (MICH). Images by the authors.

*condorensis*. The narrow shape of the leaves of *C. condorensis* is also unusual in species of sect. *Cyclostigma*. Pistillate flowers are scarce, or frequently absent, in the examined specimens of *Croton condorensis*, whereas in sect. *Cyclostigma* they are usually much more numerous per inflorescence. The surface of the seeds in sect.

*Cyclostigma* is usually rugose, or with some kind of ornamentation. In contrast, the seeds of *Croton condorensis* have a smooth, shiny and marbled surface. In addition, none of the Ecuadorian species of sect. *Cyclostigma* grow on the type of high elevation sclerophyllous vegetation where *C. condorensis* occurs. These observations, along with the morphological differences listed above, suggest that the new species could be an isolated lineage within *Croton*. However, the indication of sect. *Cyclostigma* as the most likely section to which *C. condorensis* belongs, as suggested by the sectional key (van Ee *et al.* 2011), cannot be ruled out until additional specimens as well as sequence data from this species become available for additional morphological and phylogenetic analyses.



**FIGURE 2.** Map of Ecuador and a detail of the area of distribution of *Croton condorensis* in southern Ecuador.

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