TWO NEW SPECIES OF *MONOPYLE* (GESNERIACEAE) FROM THE CHOCÓ BIOGEOGRAPHIC REGION OF WESTERN ECUADOR

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Abstract. Recent herbarium research and exploratory field expeditions to the Chocó biogeographic region along the western Andes and Pacific forests of northern Ecuador resulted in the discovery of two new species, which are here described as *Monopyle incisa* and *Monopyle tomentosa*, both endemic to premontate wet to cloud forests of the region. Based on IUCN guidelines, *Monopyle incisa* is preliminarily assessed as Endangered (EN) and *M. tomentosa* as Vulnerable (VU). We provide a diagnostic table for six commonly confused *Monopyle* species from western Ecuador, contributing to floristic knowledge of the Tumbes-Chocó-Magdalena biodiversity hotspot and supporting conservation efforts in this highly threatened region.

Keywords. Biodiversity, Centinela, Chocó, Floristics, Endemism, Tumbes-Chocó-Magdalena biodiversity hotspot.

Resumen. Investigaciones recientes en herbarios y expediciones de campo exploratorias en la región biogeográfica del Chocó, a lo largo de los Andes occidentales y los bosques del Pacífico del norte de Ecuador, dieron como resultado el descubrimiento de dos especies nuevas, que aquí se describen como *Monopyle incisa* y *Monopyle tomentosa*, ambas endémicas de los bosques húmedos premontanos a bosques nublados de la región. Con base en los criterios de la UICN, se asigna un estado de conservación preliminar En Peligro (EN) para *Monopyle incisa* y Vulnerable (VU) para *M. tomentosa*. Proporcionamos una tabla diagnóstica para seis especies de *Monopyle* comúnmente confundidas del occidente de Ecuador, contribuyendo al conocimiento florístico del hotspot de biodiversidad Tumbes-Chocó-Magdalena y apoyando los esfuerzos de conservación en esta región altamente amenazada.

Palabras clave. Biodiversidad, Centinela, Chocó, Florística, Endemismo, hotspot de biodiversidad Tumbes-Chocó-Magdalena.

The family Gesneriaceae comprises more than 3,900 species distributed among over 150 genera (Weber, 2004; Weber et al., 2013; GRC, 2026) and belongs to the order Lamiales. Current classifications recognize three subfamilies and seven tribes (Weber et al., 2013, 2020), a classification that is well supported by molecular phylogenetic studies demonstrating the monophyly of these major lineages (Ogutcen et al., 2021). In the Neotropics, the greatest diversity is concentrated in the subfamily Gesnerioideae, which includes more than 1,200 species in 77 genera (Clark et al., 2020; GRC, 2026). The genus *Monopyle* Moritz ex Benth. is assigned to the tribe Gesnerieae and the subtribe Gloxiniinae G. Don (Weber et al., 2013, 2020).

Native to the Neotropics, *Monopyle* includes terrestrial understory herbs, epiphytes, and subshrubs occurring from Guatemala southward into northern South America. *Monopyle* was monographed by Conrad Morton (1945), and approximately 25 species are currently recognized (Clark et al., 2020; GRC, 2026). However, continued botanical exploration throughout the Neotropics and the steady accumulation of herbarium collections have revealed substantially greater diversity than was available to Morton (Keene et al., 2011; Clark et al., 2022; Clark

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and Keene, 2023). Preliminary monographic research by Keene (2013) further indicates that several broadly circumscribed species likely represent complexes of more narrowly delimited taxa, suggesting that the diversity of *Monopyle* has been underestimated. This pattern of localized endemism may be linked to the genus's splash-cup seed dispersal mechanism, which likely restricts dispersal and limits opportunities for long-distance colonization (Ertelt, 2013).

The genus is traditionally characterized by strongly anisophyllous opposite leaves, campanulate flowers that are white or white with purple markings, and the presence of barbed trichomes. These barbed trichomes, referred to as uncinate by Keene (2013), are terminally curved, forming hook-like structures that facilitate adhesion of plant parts (especially calyces and corollas) to surrounding surfaces. This feature is best observed in the field, where flowers readily adhere to clothing, and it formed the basis for the recently described species *Monopyle glutinosa* J. L. Clark & Keene (Clark et al., 2022). The presence of barbed trichomes, especially on the calyx and corolla, is likely more widespread in *Monopyle* than previously documented. The genus is further distinguished by a combination of vegetative and floral characters, including enlarged stem internodes between opposite leaf pairs and a basal corolla osmophore that functions as a floral fragrance gland.

Here we describe two new species from the Chocó biogeographic region of northwestern Ecuador, occurring in coastal Pacific forests and on the western Andean slopes (Fig. 1).

Recent specimen collections and field expeditions have resulted in several new species descriptions in *Monopyle*, reflecting renewed taxonomic attention to the genus in northwestern South America (Keene et al., 2011; Clark et al., 2022; Clark and Keene, 2023). The addition of *Monopyle incisa* and *M. tomentosa* brings the total species diversity of the genus to 27. These two species are sympatric in the Centinela region of Santo Domingo de los Tsáchilas Province and share the same type locality. However, *M. tomentosa* exhibits a broader distribution, extending from Mashpi Lodge in Pichincha Province to the Cordillera Mache-Chindul in Esmeraldas Province.

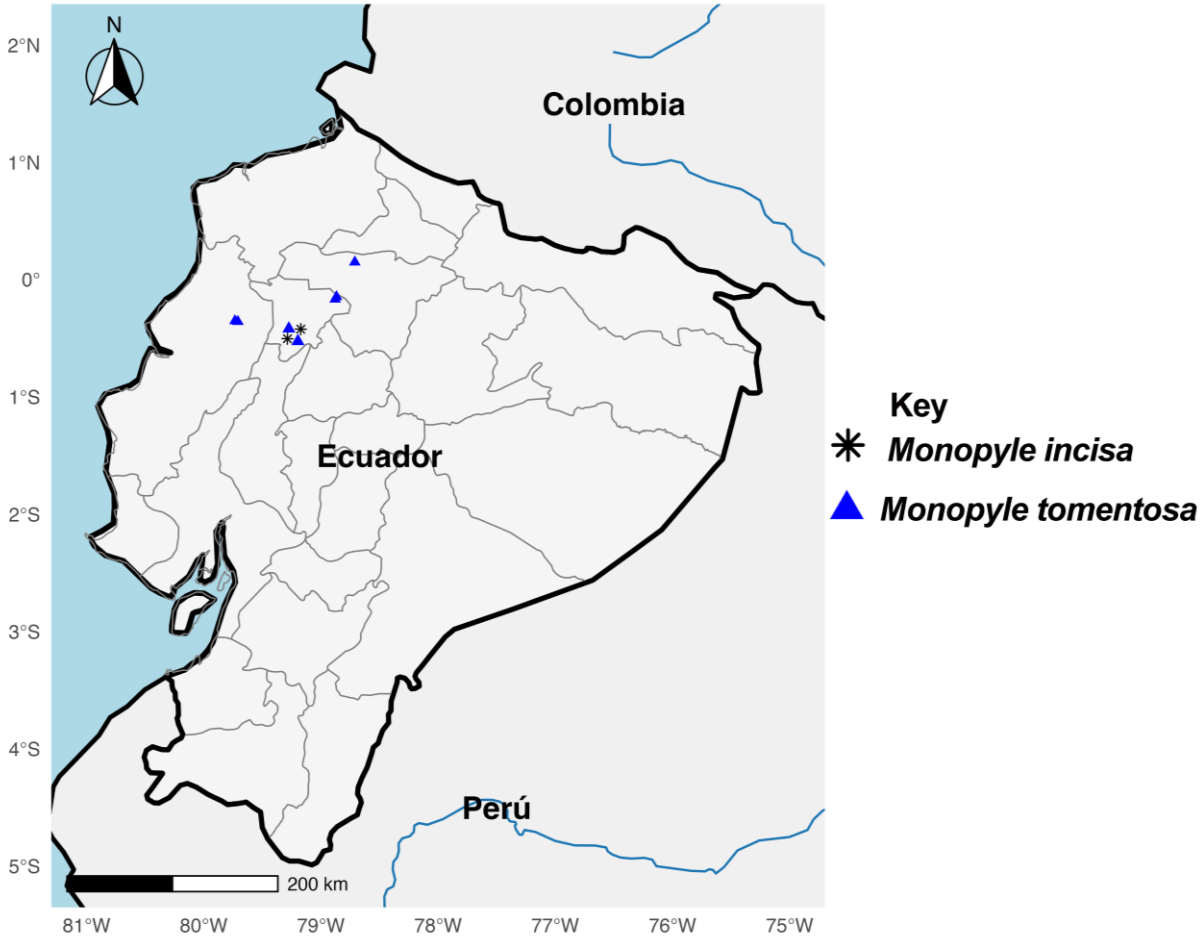

FIGURE 1. Distribution map of *Monopyle incisa* (asterisks) and *M. tomentosa* (triangles).

These discoveries contribute to a growing body of evidence that the remnant low-elevation cloud forests of western Ecuador continue to harbor significant undocumented plant diversity despite extensive habitat loss (Dodson and Gentry, 1991; White et al., 2024). Continued botanical exploration, taxonomic research, and specimen-based documentation remain essential for understanding this diversity and for informing conservation priorities in one of the most heavily transformed tropical forest regions of the Neotropics.

MATERIALS AND METHODS

Field documentation included photography of living plants prior to the preparation of voucher specimens, which were pressed, dried, and deposited at the Missouri Botanical Garden (MO), New York Botanical Garden (NY), Pontificia Universidad Católica del Ecuador (QCA), Museo Ecuatoriano de Ciencias Naturales–Herbario Nacional del Ecuador (QCNE), Marie Selby Botanical Gardens (SEL), United States National Herbarium (US), and other herbaria. Images of living plants were taken with a Nikon DSLR camera, 105-mm macro lenses, and Nikon SB-29S ring flash. Morphological characters were evaluated from living plants, specimens preserved in alcohol, herbarium material, and digital photographs. Measurements were obtained using ImageJ (https://imagej.net/ij/).

The conservation status was evaluated in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012) and the recommendations of the IUCN Standards and Petitions Committee (2024). Assessments incorporated field observations, documented localities, and estimates of population size. Extent of occurrence (EOO) and area of occupancy (AOO) were calculated with GeoCAT (Bachman et al., 2011; https://geocat.kew.org/) using the standard 2 km² grid-cell resolution.

TAXONOMY

Monopyle incisa J. L. Clark, *sp. nov.* TYPE: ECUADOR. Santo Domingo de los Tsáchilas: cantón Santo Domingo. Parroquia Polanco. Sector Bolo Alto. Cascada Escondida (propiedad de Felipe Lliuipuma & Elsa Simbaña), waterfalls of the Bolo watershed, 0º29’13.4" S, 79º11’0.4" W, 840–850 m, 13 July 2022 (fl). *John L. Clark, Lily Hooge, Camilo Restrepo, Russell Clark & Eduardo Muñoz 16818* (Holotype: QCA; Isotypes: AAU, BRIT, CAS, COL, E, F, FLAS, G, MO, NY, SEL [SEL092065], US). Fig. 2.

Differs from all other *Monopyle* by the foliose calyx lobes with deeply incised apices.

Terrestrial *herbs* to *subshrubs* with slender dorsiventral shoots, 0.3–0.7 m tall, *roots* fibrous, *stems* green, internodes swollen between nodes, 2.1–3.2 mm in diameter, glabrous; *leaves* opposite, anisophyllous, interstipular scar present; the larger leaf of pair with petioles 0.5–1.5 cm, green, sparsely pilose, blade asymmetrical, broadly ovate, base oblique to 11 mm difference between the two basal lobes, apex acuminate, 7.5–15 × 3.1–8.2 cm, margin serrate and often with glands at tips of serrations; adaxially green and glabrous, abaxially green or green suffused with red, glabrescent to puberulent; the smaller leaf in the pair similar in shape and surface indumentum, nearly sessile or with petioles to 2 mm long, 2.1–3.2 × 1.0–1.6 cm; *inflorescences* terminal (branching near apex can appear axillary), erect to somewhat lax, appearing corymbose or paniculate due to termination of rachis; bracts in pairs at base of each bifurcation, 1–2 × 0.3–0.7 mm, persistent, opposite, adaxially glabrous, abaxially sparsely pilose; *peduncles* 2.5–5.5 cm, glabrous; rachis 2.0–5.6 cm, 1–3 nodes per rachis with 1–4 cymules; *pedicels* 0.8–1.6 cm long; *calyx* usually green, rarely green suffused with red, lobes five, truncate to reflexed, lobes broadly oblong, foliose, apical margins deeply incised, 0.8–1.3 × 0.5–0.7 cm, adaxially and abaxially with uniformly pilose barbed or uncinate trichomes; *corolla* campanulate with dorsal keel at the base, tube and corolla lobes ranging from white to white suffused with blue, often darker blue on the margin and throat, 1.5–2.1 × 1.8–2.0 cm, osmophore golden to orange; limb glabrous on inside and puberulent on outside, dorsal and lateral lobes 0.7–1.0 × 1.5–1.6 cm, ventral lobe 0.9–1.4 × 1.7–1.9 cm; *androecium* with four stamens, 5.3–7.6 mm, didynamous, included, filaments 3.8–8.8 mm, adnate to base of corolla, anthers 0.7–1.2 × 0.5–0.9 mm, connivent for up to 0.9 mm, often with an inflated region near the base of the theca, staminode absent; *gynoecium* with inferior ovary, up to 1.9 mm wide, puberulent, style up to 8.6 mm, densely to sparsely puberulent from the base to apex, stigma bilobed, nectary absent. Fruits 9–15.1 × 2.3–3.5 mm, pedicels becoming flexuose in fruit, dehiscing along the dorsal surface, calyx persistent and accrescent in fruit; seeds numerous, ellipsoid, light black.

Additional specimens examined: ECUADOR. Santo Domingo de los Tsáchilas: cantón Santo Domingo, parroquia El Esfuerzo, road between El Esfuerzo and Palanco, 7.3 km east of El Esfuerzo, before arriving in the village of Alegría del Bolo, 0º25’23.6" S, 79º14’7.2" W, 446 m, 20 March 2022 (fl), *J. L. Clark, X. Cornejo & C. Restrepo 16649* (QCA, SEL); cantón Santo Domingo, parroquia Polanco, sector Bolo Alto, Bosques y Cascadas Las Rocas (propiedad de Eduardo Diaz), waterfalls of the Bolo watershed, 0º28’38.1" S, 79º11’22.4" W, 560–

600 m, 12 July 2022 (fl), *J. L. Clark, C. Restrepo, R. Clark & E. Muñoz 16786* (MO, NY, QCA, SEL, US); cantón Santo Domingo, Cascadas de Cristal, property of Fabio Huerta, near second waterfall, 0º27'55.865" S, 79º7'52.719" W, 950–1000 m, 15 September 2023 (fr, fl), *J. L. Clark et al. 17652* (BRIT, F, G, MO, NY, QCA, SEL, US); cantón Santo Domingo, recinto Palmar del Bimbe, remnant forest (2+ hectares) adjacent to pasture, between Río Placer and Río Bimbe, property owned by the Pozo family (Mercedes Pozo and Luis Angel Ullaurí), 0º30'8.91" S, 79º14'27.18" W, 600–650 m, 12 September 2023 (fl, fr), *J. L. Clark, D. M. White & N. Zapata 17702* (BRIT, MO, NY, QCA, SEL, US).

Etymology: The specific epithet *incisa* refers to the calyx lobes that are foliose and deeply incised at the apex, giving them a distinctly toothed appearance (Fig. 2).

Habitat and distribution: *Monopyle incisa* is only known from fragments of premontane wet forests surrounding Santo Domingo, between 500 and 1000 m, in the Ecuadorian province of Santo Domingo de los Tsáchilas.

Phenology: *Monopyle incisa* has been collected in flower in March, July, and September, and in fruit in March and September.

Conservation status: *Monopyle incisa* is known from the Centinela region of western Ecuador (Fig. 1), which includes the Montañas de Ila, an extra-Andean mountain system that connects with the main Andean Cordillera at its northern limit, as well as the adjacent intermontane area and Andean foothills of Santo Domingo de los Tsáchilas Province (Pitman et al., 2022; White et al., 2024). Within this region, the species has been collected in the adjacent private reserves of Cascada Escondida, Cascadas de Cristal, Bosques y Cascadas Las Rocas, and in nearby forest fragments in the Centinela foothills. The type locality is within the Bolo watershed, which includes several private contiguous reserves that constitute a forest patch of approximately 50 ha located in the intermontane area between the Andean Cordillera and the northern Montañas de Ila. The GeoCAT calculated area of occupancy (AOO) is 16 km^2 and the calculated extent of occurrence (EOO) is 52.5 km^2. *Monopyle incisa* is preliminarily assessed as Endangered (EN) under criterion B1 (EOO < 5,000 km²) and B2 (AOO < 500 km²) due to severely fragmented forests (B2a) and ongoing decline of the Centinela forests in western Ecuador [B1ab(i,ii,iii,iv) + 2ab(i,ii,iii,iv)].

The Centinela region has experienced extensive habitat loss over the past several decades. Agricultural colonization expanded rapidly following the development of road infrastructure and the growth of the city of Santo Domingo during the mid-20th century. As a result, most of the original forest cover has been replaced by agricultural landscapes dominated by cacao (*Theobroma cacao L.*), banana (*Musa acuminata* Colla), melina (*Gmelina arborea* Roxb.), balsa (*Ochroma pyramidale* (Cav. ex Lam.) Urb.), and cattle pasture (Dodson and Gentry, 1991; White et al., 2024). Although remnant forest patches persist, deforestation and land-use change continue to affect the region (Pitman et al., 2022).

Centinela became widely known after Dodson and Gentry (1991) reported extensive habitat destruction and hypothesized that many narrowly distributed plant species may have gone extinct, a phenomenon later termed the "Centinelan extinction" (Wilson, 1992). However, recent botanical exploration has demonstrated that some species once presumed extinct persist in small forest fragments. For example, *Gasteranthus extinctus* L. E.Skog & L. P. Kvist was rediscovered in multiple forest remnants in the region, leading to a reassessment of its conservation status from Critically Endangered to Endangered (Pitman et al., 2022).

Renewed botanical exploration since 2021 has continued to highlight the remarkable floristic diversity that persists in these remnant forests. Several new species have recently been described from the Centinela region and nearby areas (Cornejo and Hagsater, 2022; Cornejo and Hagsater, 2023; Fernández-Alonso and Cornejo, 2024; Clark et al., 2024; Guevara-Andino et al., 2025), and new locality records continue to expand the known distributions of newly described taxa. For example, recent iNaturalist observations suggest that *Monopyle glutinosa* J. L. Clark & Keene, originally described from Reserva Ecológica Los Ilinizas in Cotopaxi Province, also occurs in the Centinela region (Clark et al., 2022).

With several new *Monopyle* species described from western Ecuador in recent years, continued systematic study of this genus and others receiving renewed taxonomic attention will provide important insights into patterns of floristic diversity and endemism. Such research is essential for guiding conservation priorities and protecting the remaining forest fragments of the Tumbes-Chocó-Magdalena biodiversity hotspot.

Monopyle incisa is distinguished from all congeners by deeply incised apices of the calyx lobes (Fig. 2). The inflorescence is terminal and multibranched, appearing paniculate in structure. The corollas are campanulate and the shoots are glabrous. It is similar to *Monopyle chocoensis* Keene & J. L. Clark, and several specimens were initially annotated with this name. The calyx lobes in *M. chocoensis* are lanceolate, revolute (=recurved along the margins), and apically reflexed. In contrast, the calyx margins in *M. incisa* are flat and oblong. Both species share a campanulate corolla tube that is white to white

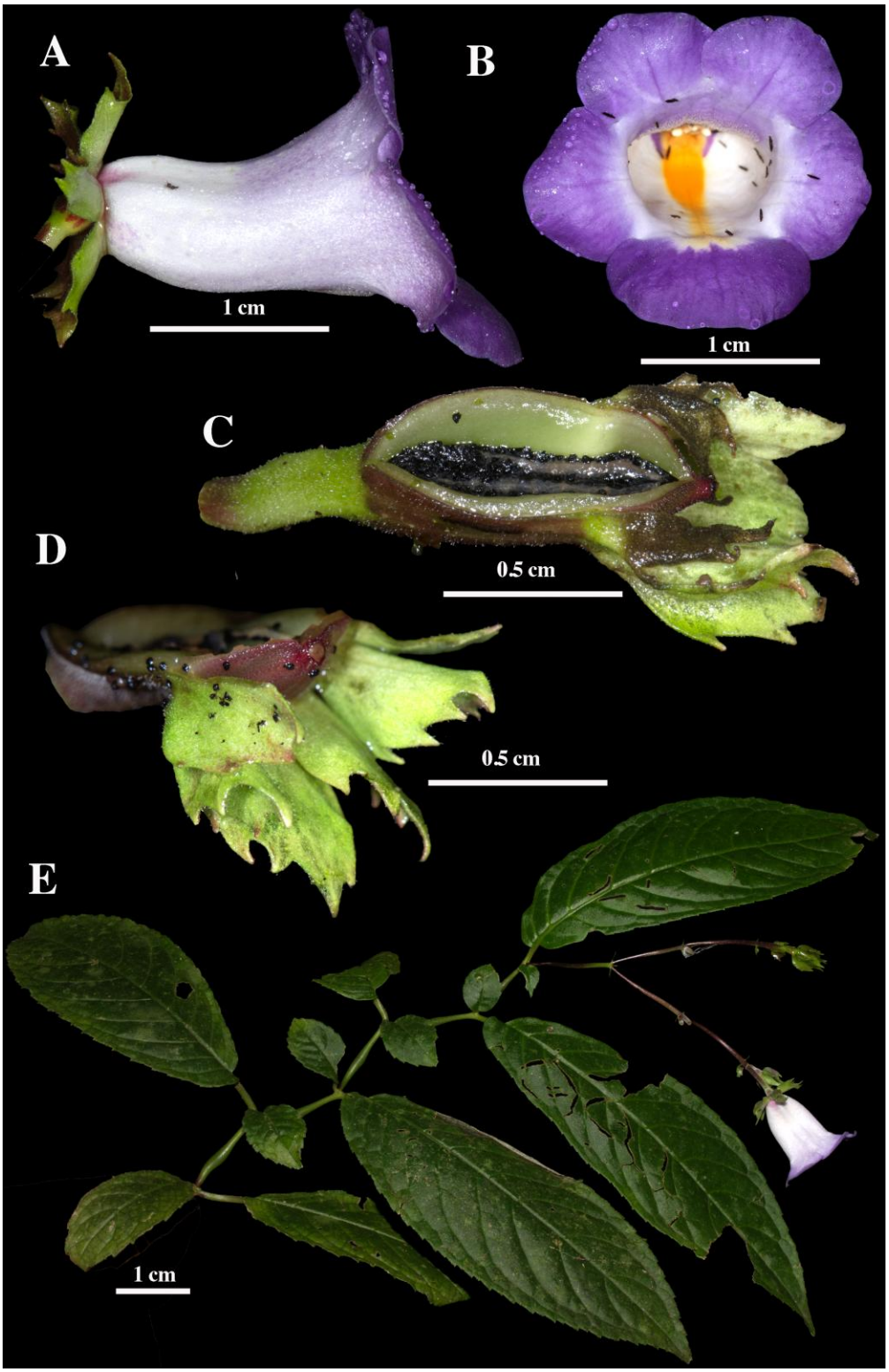

FIGURE 2. *Monopyle incisa* J. L. Clark. **A**, lateral view of mature flower; **B**, front view of mature flower; **C**, lateral view of mature fruit; **D**, front view of mature fruit featuring incised calyx lobes; **E**, habit. **A** and **B** from *J. L. Clark et al. 16786*; **C** from *J. L. Clark et al. 17652*; **D** from *J. L. Clark et al. 16818*; **E** from *J. L. Clark 17702*. Photographs by John L. Clark.

TABLE 1. Diagnostic characters distinguishing six morphologically similar *Monopyle* species from western Ecuador.

	Monopyle chocoensis Keene & J. L. Clark	*Monopyle ecuadorensis* C. V. Morton	*Monopyle incisa* J. L. Clark	*Monopyle glutinosa* J. L. Clark & Keene	*Monopyle sodiroana* Fritsch	*Monopyle tomentosa* J. L. Clark
Stem surface	glabrous	glabrous	glabrous	glabrous	pubescent	pubescent
Leaf texture	membranaceous	membranaceous	membranaceous	membranaceous	coriaceous	membranaceous
Inflorescence	highly branched (appearing paniculate)	highly branched (appearing paniculate)	highly branched (appearing paniculate)	highly branched (appearing paniculate)	unbranched (appearing racemose)	unbranched (appearing racemose)
Calyx lobe shape	lanceolate	broadly oblong	broadly oblong	oblong	lanceolate	lanceolate
Calyx lobe folding	margins revolute	margins revolute	flat	flat	flat	flat
Calyx lobe margins	entire	entire	apically incised	entire	entire	entire
Corolla dorsal keel	present	absent	present	absent	absent	absent
Corolla color	blue to white suffused with blue	blue to white suffused with blue	blue to white suffused with blue	blue to white suffused with blue	uniformly white	blue to white suffused with blue
Corolla markings	uniformly colored	uniformly colored	uniformly colored	uniformly colored	occasionally striated on corolla lobes (more so on ventral lobe)	occasionally striated on corolla lobes (more so on ventral lobe)

suffused with blue. Table 1 summarizes these and other diagnostic characters for six species in coastal Ecuador that are morphologically similar to *M. incisa*.

Monopyle tomentosa J. L. Clark, *sp. nov.* TYPE: ECUADOR. Santo Domingo de los Tsáchilas: cantón Santo Domingo. Parroquia Polanco. Sector Bolo Alto. Cascada Escondida (propiedad de Felipe Lliuipuma & Elsa Simbaña), waterfalls of the Bolo watershed, 0°29'13.4" S, 79°11'0.4" W, 840–850 m, 13 July 2022 (fl). *John L. Clark, Lily Hooge, Camilo Restrepo, Russell Clark & Eduardo Muñoz 16817* (Holotype: QCA; Isotypes: AAU, BRIT, CAS, COL, E, F, FLAS, G, MO, NY, SEL [SEL092070], US). Fig. 3.

Similar to *Monopyle sodiroana* Fritsch in the presence of trichomes on the stems and terminal inflorescences with flowers in fascicles along an unbranched elongate axis (appearing racemose), but differing in the smaller blue to purple corollas (< 2.0 cm long) (vs. mostly white corollas > 2.5 cm long in *M. sodiroana*).

Terrestrial *herbs* to *subshrubs* with dorsiventral shoots, 0.4–0.8 m tall, *roots* fibrous, *stems* green, internodes swollen between nodes, 2.2–3.7 mm in

diameter, densely pubescent; *leaves* opposite, anisophyllous, interstipular scar present; the larger leaf of pair with petioles 0.5–1.1 cm, green, pilose, blade asymmetrical, broadly ovate, base oblique to 10 mm difference between the two basal lobes, apex acuminate, 9.0–19 × 3.0–9.0 cm, margin serrate; adaxially green and sparsely pilose, abaxially green, pilose (especially along venation); the smaller leaf in the pair similar in shape and surface indumentum, nearly sessile or with petioles to 2 mm long, 1.1–2.5 × 1.0–2.0 cm; *inflorescences* terminal and unbranched (appearing racemose), 9–18 cm long, erect to somewhat lax; bracts in pairs at base of each cymule, 1–2 × 0.3–0.5 mm, persistent, opposite, adaxially glabrous, abaxially sparsely pilose; *pedicels* 0.4–0.8 cm long; *calyx* green, lobes five, truncate, lobes lanceolate, margins entire, 0.6–0.9 × 0.2–0.4 cm, adaxially and abaxially with uniformly pilose trichomes; *corolla* campanulate, tube and corolla lobes ranging from white suffused with dark blue to uniformly blue, often darker blue on the margin and throat, lower portion of throat with dark purple striations that extend to the dorsal lobe, 1.5–1.9 × 1.2–1.3 cm, osmophore golden to orange; limb glabrous on inside and puberulent on outside, dorsal and lateral lobes 0.6–0.9 × 1.3–1.4 cm, ventral lobe 0.8–1.2 × 1.6–1.7 cm; *androecium* with four stamens, 4.7–6.9 mm, didynamous, included, filaments 3.6–7.8 mm, adnate to base of corolla, anthers 0.5–1.0 × 0.4–0.6 mm, connivent for up to 0.8 mm, often with an inflated region near the base of the theca; *gynoecium* with inferior ovary, up to 1.7 mm wide, puberulent, style up to 8.4 mm, densely to sparsely puberulent from the base to apex, stigma shallowly bilobed, nectary absent. Fruits 8.0–13.1 × 2.0–3.1 mm, pedicels becoming flexuose in fruit, dehiscing along the dorsal surface, calyx persistent and accrescent in fruit; seeds numerous, ellipsoid, black.

Etymology: The specific epithet *tomentosa* refers to the dense indumentum along the stems, especially abundant between the nodes (Fig. 3D).

Additional specimens examined: ECUADOR. Esmeraldas: cantón Quinindé, Reserva Ecológica Mache-Chindul, Bilsa Biological Reserve, 35 km W of Quinindé, 5 km W of Santa Isabel, Rana Roja trail, 0º21’ N, 79º44’ W, 400–600 m, 1 January 1997 (fl), *J. L. Clark, E. Austen, S. Bennett & D. Kapan 3676* (MO, QCNE, US); cantón Quinindé, Reserva Ecológica Mache-Chindul, Bilsa Biological Reserve, 35 km W of Quinindé, sendero Rojo (= Sendero Rana Rojo), 0º21’ N, 79º44’ W, 400–600 m, 20 August 2003 (fl), *J. L. Clark, R. Fleiss & I. Salinas 8814* (QCNE, SEL, US); cantón Quinindé, Reserva Ecológica Mache-Chindul, 35 km W of Quinindé, collections made along main road between Santa Isabel and Station, 0º21’ N, 79º44’ W, 400–600 m, 20 May 2007 (fl), *J. L. Clark et al. 9615* (ECUAMZ, SEL, US); cantón Quinindé, Reserva Ecológica Mache-Chindul, 35 km W of Quinindé, Bilsa Biological Station, remnant patches of forest along main road near entrance to Bilsa, 0º21’23" N, 79º42’29" W, 500–600 m, 16 May 2011 (fl), *J. L. Clark et al. 12105* (ECUAMZ, MO, SEL, US); cantón Quinindé, Reserva Ecológica Mache-Chindul, Bilsa Biological Reserve, 0º20’30.46" N, 79º42’31.02" W, 617 m, 16 March 2024 (fl), *J. L. Clark et al. 18473* (BRIT, CAS, G, MO, MT, NY, QCA, SEL, US). Pichincha: cantón Quito, parroquia Pacto, Mashpi Lodge (Reserva Mashpi), 0º9’30" N, 78º53’7.8" W, 1000 m, 15 March 2019 (fl), *J. L. Clark & L. Jost 16298* (BM, BRIT, E, F, FLAS, G, MO, MT, NY, QCA, SEL); cantón Quito, parroquia Pacto, Mashpi Lodge (Reserva Mashpi), 0º9’57.82" N, 78º52’40.63" W, 967 m, 26 March 2024 (fl), *J. L. Clark et al. 18600* (BRIT, CAS, G, MO, MT, NY, QCA, SEL). Santo Domingo de los Tsáchilas: cantón Santo Domingo, parroquia El Esfuerzo, road between El Esfuerzo and Palanco, 7.3 km east of El Esfuerzo, before arriving in the village of Alegría del Bolo, 0º25’23.6" S, 79º14’7.2" W, 446 m, 20 March 2022 (fl), *J. L. Clark, X. Cornejo & C. Restrepo 16648* (QCA, SEL).

Habitat and distribution: *Monopyle tomentosa* occurs in premontane to cloud forests of western Ecuador within the Chocó biogeographic region at elevations of 400–1000 m (Fig. 1). It is known from the provinces of Pichincha, Santo Domingo de los Tsáchilas, and Esmeraldas.

Phenology: *Monopyle tomentosa* has been collected in flower in January, March, May, July, and August, and in fruit in March.

Conservation status: *Monopyle tomentosa* is locally abundant in two well-established reserves: Bosque Protector Mashpi in the province of Pichincha and Reserva Ecológica Mache-Chindul in the province of Esmeraldas. An additional subpopulation occurs in a forested area within the Bosques y Cascadas Las Rocas private reserve (type locality), a ca. 50-hectare forest patch located in the intermontane region between the Andean Cordillera and the northern Montañas de Ila. The GeoCAT calculated area of occupancy (AOO) is 24 km² and the extent of occurrence (EOO) is 4,883.9 km². *Monopyle tomentosa* is preliminarily assessed as Vulnerable (VU) based on its limited area of occupancy (B2: AOO <2,000 km²), severely fragmented forests (B2a), and the continuing decline in habitat quality associated with ongoing threats to the Centinela forests of western Ecuador [B2ab(i,ii,iii)], as explained in the conservation status for *M. incisa***.**

Monopyle tomentosa is readily distinguished by the presence of dense trichomes along the stems (Fig. 3D). The campanulate corolla, with a tube ranging

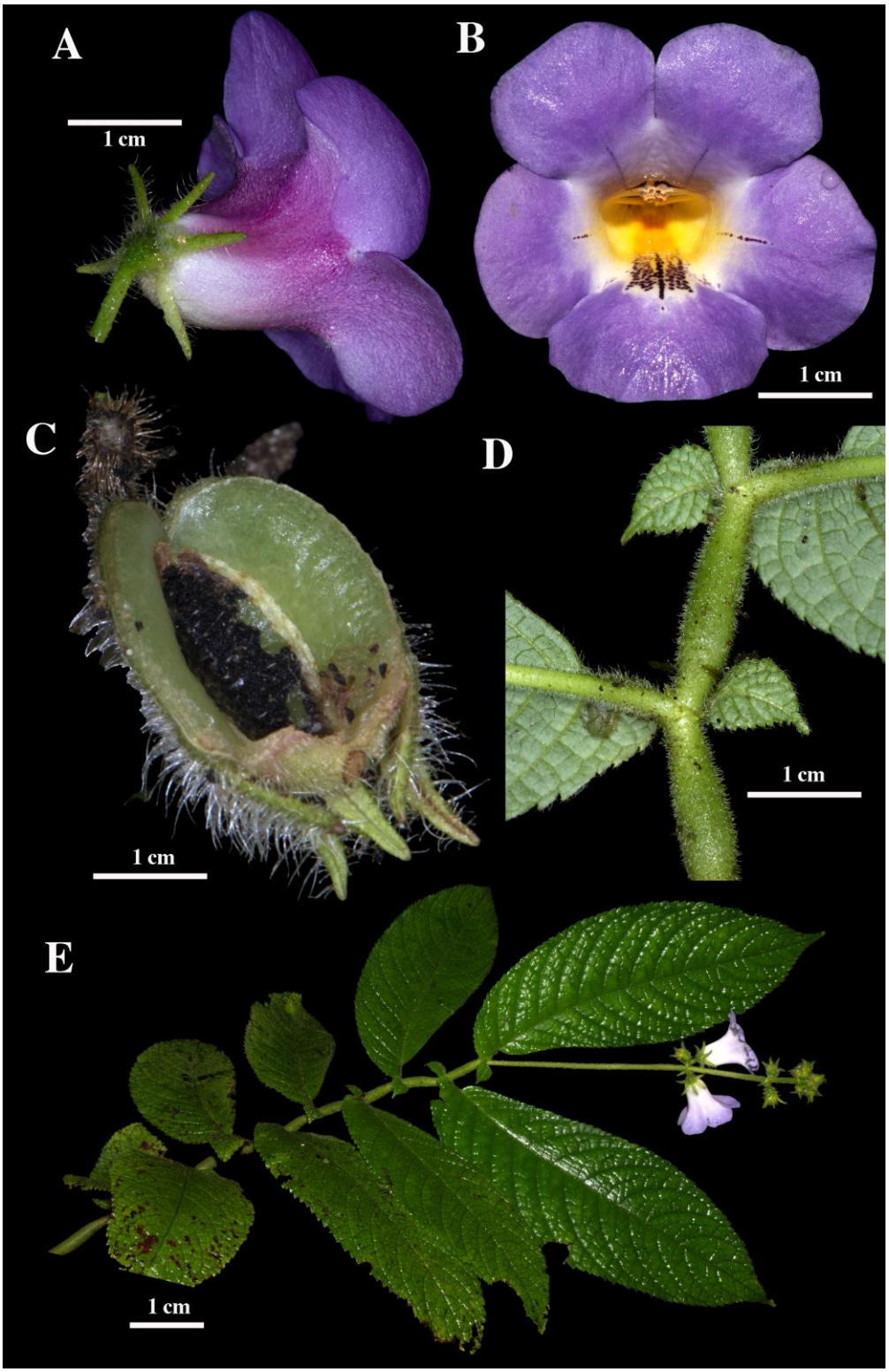

FIGURE 3. *Monopyle tomentosa* J. L. Clark. **A**, rear view of mature flower; **B**, front view of mature flower; **C**, dorsal view of mature fruit; **D**, pubescent swollen internode of stem; **E**, habit. **A** from *J. L. Clark 18600*; **B** from *J. L. Clark et al. 16648*; **C** from *J. L. Clark 16298;* **D** and **E** from *J. L. Clark 16817*. Photographs by John L. Clark.

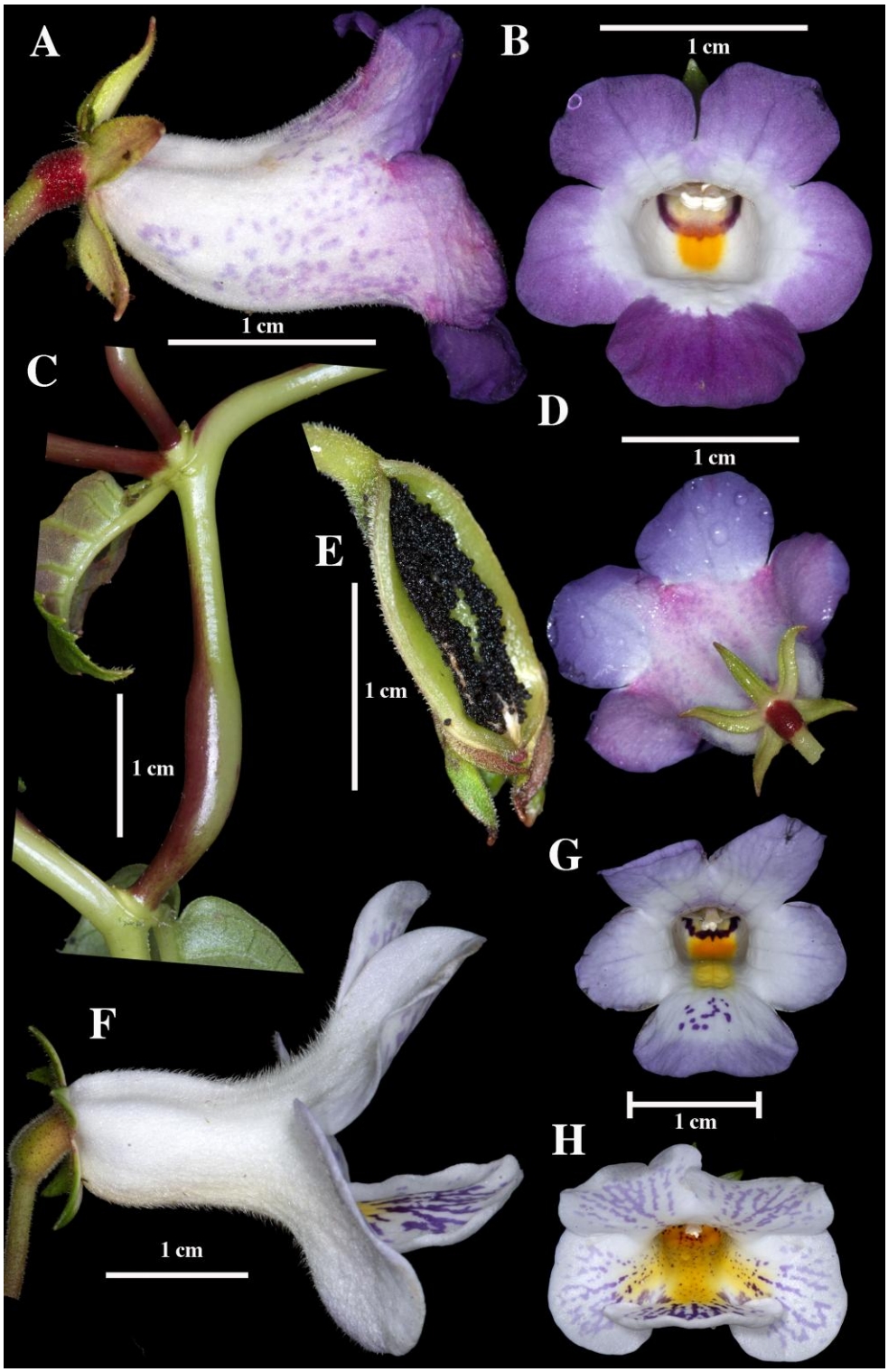

FIGURE 4. **A–E.** *Monopyle chocoensis* Keene & J. L. Clark. **A,** lateral view of mature flower; **B**, front view of mature flower; **C**, glabrous swollen internode of stem; **D**, rear view of mature flower; **E**, dorsal view of mature fruit. **F–H**. *Monopyle sodiroana* Fritsch. **F**, Lateral view of mature flower; **G** and **H**, front view of mature flowers. **A** from *J. L. Clark et al. 17189*; **B** from *J. L. Clark et al. 18479*; **C** from *J. L. Clark & J. Rubio 15898*; **D** from *J. L. Clark et al. 11053*; **E** from *J. L. Clark et al. 10842;* **F–H** from *J. L. Clark et al. 17104.* Photographs by John L. Clark.

from dark blue (Fig. 3A) to white suffused with blue, is similar to that of *M. chocoensis* (Fig. 4A, B, D). However, *M. chocoensis* differs in having swollen internodes that are glabrous (Fig. 4C), whereas the internodes in *M. tomentosa* are consistently tomentose (Fig. 3D). Another species with tomentose stems is *Monopyle sodiroana* (Fig. 4F–H), but these two species differ markedly in corolla size and coloration. In *M. sodiroana*, the corolla tube is consistently larger (> 2.5 cm long) and uniformly white externally. In contrast, the corolla tube in *M. tomentosa* is smaller (< 2.0 cm long) and blue externally (Fig. 3A–B), lacking the spotting typical of many other *Monopyle* species. Table 1 summarizes these and other diagnostic characters for six species in coastal Ecuador that are morphologically similar to *M. tomentosa*.

Another species that shares a pubescent stem with *Monopyle tomentosa* but is geographically disjunct is *M. puberula* C. V. Morton. *Monopyle puberula* is endemic to Central America, and there are no known intermediate populations between Panama and Ecuador (i.e., it is absent from Colombia). The two species are readily distinguished by calyx morphology and corolla color. *Monopyle tomentosa* has lanceolate calyx lobes (Fig. 3A), whereas the calyx lobes of *M. puberula* are broadly oblong. In addition, the corollas of *M. tomentosa* are blue (Fig. 3A, B), whereas those of *M. puberula* are nearly white to white with a faint blue suffusion.

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