



New species of *Ceratostema* (Ericaceae: Vaccinieae) from the southeast Andes of Ecuador-I

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Abstract

Two new species of *Ceratostema* from the Morona-Santiago province in Ecuador are described and illustrated. *Ceratostema jorgebritoi* has unique spirally arranged leaves, and is the second species in the genus with tetramerous flowers. *Ceratostema sieteglesiana* is distinguished by the plinerved leaves and the peculiar five-winged hypanthium, further complimented with a conspicuous calyx limb. The taxonomic similarities of these new taxa are discussed and information about their distribution, habitat, and conservation status is provided.

Key words: Morona-Santiago, northern Andes, rainforest, southeastern Ecuador, taxonomy

Introduction

The globally distributed family Ericaceae is currently represented by ca. 4426 species included in 129 genera classified into eight subfamilies and 20 tribes (Kron *et al.* 2002). Of these tribes, Vaccinieae Reichenbach is characterized by having inferior ovaries that produce berry-like fruits and has approximately 600 species found across the Neotropics (Luteyn 2002, 2021). Vaccinieae shall consist of 17 genera in Ecuador, of which the largest genus is *Ceratostema* Jussieu (1789: 163). Moreover, Ecuador is considered the center of diversity for the genus with 32 species of which 27 are considered endemic (Luteyn 2021).

Based on phylogenetic analyses by Pedraza *et al.* (2015), *Ceratostema* is not a monophyletic genus, although it is recognizable morphologically. The species belonging to this genus are distinguished by the pedicels that are usually articulate near the calyx, large corollas with proportionately elongated lobes, stamens that are generally equal to the length of the corolla, anthers with coarsely papillate thecae, and elongated tubules of about half the diameter of the thecae (Luteyn 2005).

Southeastern Ecuador is the source of several new Ericaceae species discovered over the last decade. Efficient exploration conducted across the forests of this region has resulted in the discovery of species like *Ceratostema agettiorum* Jiménez & Garzón (2024: 74), *C. louciana* Cornejo, Tello & Luteyn (2024: 88), *C. zamorana* Jiménez & Vélez-Abarca (2021: 266), *Disterigma chriscanadayi* Cornejo & Luteyn (2024: 90) and *Sphyrospermum grandiflorum* Cornejo & Pedraza (2019: 66), among others. During fieldwork conducted since February 2023, Marco Jiménez and Henry Garzón found additional species of *Ceratostema* in the south of Morona-Santiago province, which upon further research, those proven to be new taxonomic entities and are here illustrated and described.

Materials and methods

All specimens examined were compared with the original descriptions of the nearest and most similar members of the genus *Ceratostema* (Benth 1844, Smith 1932, Luteyn 1996, Jiménez *et al.* 2021). Digital images of the holotype of *Ceratostema flexuosum* (Smith 1932: 357) Macbride (1944: 42), *C. lanceolatum* Benth (1844: 142), *C. megalobum* Luteyn (1996: 221), *C. oellgaardii* Luteyn (1996: 224) hosted at AAU, K, NY were provided (acronyms in accordance with Thiers, 2024). The neotype of *C. reginaldii* (Sleumer 1941: 400) Smith (1952: 59) hosted at NY was also examined using the online available AAU Herbarium database (https://www.aubot.dk/search_form.php), GBIF (<https://www.gbif.org>), JSTOR Global Plants (<https://plants.jstor.org/>) and Smithsonian National Museum of Natural History collection (<https://collections.nmnh.si.edu/search/botany/>).

The measurements of the vegetative and floral parts were made from living material in the field. The fresh flowers were stored in 70% ethanol and glycerol. Digital images were taken with a Nikon D3100 camera with AF-S DX Micro NIKKOR 40mm f/2.8G lens and Raynox DCR-250 Super Macro lens. Furthermore, two Nikon SB-700 AF speedlight flashes and a Panasonic® FZ300 camera were used to ensure the capture of the true *in situ* colors. The figures and the composite plate were prepared with Adobe Photoshop v. 21.1.1. The distribution map was prepared using ArcGis Desktop 10.3. The plants of the new species were collected under permit MAATE-DBI-CM-2022-0248 granted by the Ministerio del Ambiente y Transición Ecológica de Ecuador (MAATE). The geographic coordinates of the specimens were omitted for conservation reasons; however, detailed data on the specimens examined can be consulted in the herbarium vouchers.

Taxonomy

1. *Ceratostema jorgebritoi* M.M.Jiménez & H.Garzón, *sp. nov.* Figs. 1–4.

Type:—ECUADOR. Morona-Santiago: Gualaquiza, Jempe Lodge, 1789 m, 28 January 2023, *H. Garzón & M. Jiménez 172* (holotype: HUTPL!).

Diagnosis: The new species is most similar to *Ceratostema flexuosum* (A.C. Sm.) J.F. Macbr., in having tetramerous flowers, from which it is distinguished by the ovate (*vs.* lanceolate) calyx lobes, 5–9 plinerved (*vs.* 3–5 plinerved) leaves that are spirally arranged (*vs.* distichous), terminal inflorescence (*vs.* axillary), much larger floral bracts (26.0 × 9.5 mm *vs.* 4.0–5.0 × 2.0 mm), longer hypanthium (3.4–10.1 mm *vs.* 3.0–4.0 mm long), lanceolate-deltate (*vs.* ovate) calyx lobes with an acuminate apex (*vs.* acute), and narrowly triangular (*vs.* lanceolate) corolla lobes.

Erect epiphytic *shrub*; axonomorphous roots with well-developed lignotubers, lignotubers subspherical 10.0–21.5 × 10.2–23.8 cm in circumference. *Stems* terete to subterete, glabrous, slightly arching, up to 61 cm long arising from the lignotuber, covered by leaves from near the base, the bark dark brown, cracking longitudinally and exfoliating, twigs terete to complanate, glabrous or minutely pubescent in new twigs, striate after exfoliation, dark brown, up to 36 cm long, new twigs pale green suffused with pink; axillary buds emerging up to 1 mm above the leaf node, compressed; axillary bud bracts 2–3, long-triangular to subulate, 1.8–1.9 × 1.0 mm, apex acuminate. *Leaves* alternate, spirally, rarely subsecundly or distichously arranged, suberect, caducous; petioles suffused with pink, subterete, rugose, 3.7–4.9 × 1.8–2.4 mm, minutely pubescent; blades thickly-coriaceous, ovate, 3.8–6.6 × 1.9–3.8 cm, dark green adaxially, paler abaxially, slightly polished adaxially, centrally channeled, revolute, finely wrinkled, base cordate to subcordate, apex subobtuse, glabrous, weakly 5–9 plinerved from near the base, the midrib thickened and impressed in the proximal 8 mm adaxially, raised and conspicuous abaxially, the secondary veins anastomose, plane adaxially and plane to weakly impressed abaxially, veinlets slightly raised, anastomose, reticulate adaxially. *Inflorescence* terminal, racemose, congested, 2–8-flowered, sessile to very short-pedunculate; peduncle subterete, pubescent, pale green, up to 9.4 mm long; rachis subterete, ribbed, 0.7–2.9 cm long, 2.4–3.2 mm thick, pubescent; floral bracts large, pink to green-salmon in color, elliptic, acuminate, puberulent at both sides with caducous hairs, concave, 14–26.0 × 7–9.5 mm, ciliate up to the margin; pedicel slightly recurved to arcuate, pale green suffused with magenta or salmon, turning darker to the hypanthium, pubescent, subterete, 1.4–2.4 cm long, 2.8–3.3 mm thick, articulate with the calyx; bracteoles 2, located near the base and opposite, pink to greenish salmon colored, sparsely pilose with caducous hairs, concave to slightly concave to the base, lanceolate to elliptic, 11.8–12.5 × 3.8–4.5 mm, apex triangular, obtuse to acute. *Flowers* 4-merous, descending; calyx 19.8–33.1 × 20.1–24.6 mm, pubescent, pink to salmon with the hypanthium darker especially the

ribs; *hypanthium* widely obconic, truncate, 5-ribbed, 5.1–6.7 × 3.4–10.1 mm; limb open, spreading, 18.0–19.9 × 20.8–33.1 mm; lobes 4, ovate, 5.7–7.5 × 15.4–16.9 mm, surface puberulous at both sides, with caducous hairs, faintly veined and rugose, margins thin and involute, the apices and sinuses acute. *Corolla* thick-carnose, bistratose, cylindrical but slightly narrowing distally, terete in cross-section, 4.3–4.9 cm long, 9 mm in diameter at the base and 6 mm in diameter at mouth, pink or salmon colored with white pubescence; *lobes* 4, spreading, narrowly triangular, acuminate, 18–23 × 3–5 mm, black with the tip glabrous, internally black, polished, channeled, subverrucose and puberulous. *Stamens* 8, nearly equaling the corolla in overall length, each pair unequal with each other, 4.0–4.1 cm long; *filaments* 8.2–8.5 mm long, connate, white to the base and apex, pinkish around the middle, with very few hairs to densely pilose towards the junction with thecae; *anthers* 3.5–3.8 cm long overall, *thecae* much shorter than the tubules, 4–5 mm long, conspicuously papillose; *tubules* distinct, but seemingly connate near the proximal 5/6, glabrous, 3.3–3.4 cm long, dehiscent by terminal pores 0.7 mm long; *style* as long as the corolla, 4.8–5.0 cm long, glabrous, pale green with the tip pink-black; stigma truncated. *Fruits* baccate, puberulent, 3.0 × 4.3 cm in diameter, greenish-yellow when ripe, a tetragonal pyramid with the base pinacoid and the persistent calyx lobes to the apex.

Distribution and habitat:—*Ceratostema jorgebritoi* was found in the canton of Gualaquiza, province of Morona-Santiago, southeastern Ecuador. Additional specimens were observed 1.6 km south and 4 km southeast of the type specimen and were vouchered with photographs. The new species is known from the eastern Andean foothills at altitudes of 1600–1800 m, where it grows both in primary forests and disturbed secondary areas (Figs. 3, 4). Within its natural habitat, it has been found on tree branches near the canopy, while in pastures the species is restricted to relict trees. *C. jorgebritoi* is mainly founded growing on *Alzatea verticillata* Ruiz & Pavón (1792: 72), *Beilschmiedia costaricensis* (Mez & Pittier in Mez 1903: 228) Allen (1945: 415), *Cedrela nebulosa* Pennington & Daza (in Pennington & Muellner 2010: 91) (Fig. 4B), *Miconia* sp., *Micropholis venulosa* (Martius & Eichler 1863: 52) Pierre (1891: 40), *Sapium* sp., and *Vismia baccifera* (Linnaeus 1771: 277) Triana & Planchon (in Milne-Edwards *et al.* 1862: 300).

Conservation status:—EN (Endangered). The three localities of *Ceratostema jorgebritoi* are located near the buffer zone of the Runahurco Municipal Conservation Ecological Area (AECMR) (Fig. 3). The new species is restricted to the forests of the eastern foothills of the southeastern Andes which are threatened by deforestation carried out for cattle pastures (Fig. 4). Despite this, we assume *C. jorgebritoi* is protected due to its near presence to the AECMR, a protected buffer zone of consistent and stable habitats. Applying conservation analysis using the georeferenced collections, the calculated extent of occurrence (EOO) for *C. jorgebritoi* is 6.39 km², with an area of occupancy (AOO) of 24 km². We recommend a conservation status of EN (Endangered) according to the criteria B2ab(i,ii) and C due to the species having a very restricted distribution with very few individuals found (IUCN 2022).

Eponymy:—This species is dedicated to Jorge Brito-Molina from Gualaquiza, Morona-Santiago Province in Ecuador. Jorge is a biologist who has significantly contributed to the scientific knowledge of amphibians and terrestrial micromammals found in the southeastern regions of Ecuador.

Taxonomic discussion:—*Ceratostema jorgebritoi* is distinguished from its nearest related species by a unique combination of morphological traits. First of all, the petiolate and plinerved leaves are spiral to subsecundly arranged, making a distinct diagnostic characteristic even when plants are sterile, considering all other members of *Ceratostema* with distichous leaves. In flower, the large floral bracts and bracteoles, subtending its tetramerous pubescent flowers, make for another distinct difference from its most similar species, which often have smaller, glabrous flowers. Tetramerous flowers are also known in *Ceratostema flexuosum* (Luteyn 1996), which differs in its distichous leaf arrangement and glabrous flowers (Fig. 5). Reporting on the character of inflorescence in the Ecuadorian Ericaceae is useful for species identification, and the authors would like to encourage future research to include this diagnostic trait (Luteyn 1996, Pedraza-Peñalosa 2010, Luteyn & Pedraza-Peñalosa 2013).

Other differences between *Ceratostema jorgebritoi* and *C. flexuosum* are the cordate to subcordate (*vs.* cuneate to attenuate) base of the flower, the narrowly triangular to acuminate (*vs.* lanceolate, long-acuminate) corolla lobes with subobtusate (*vs.* obtusely short-acuminate) apices and the shorter stamens (4.0–4.1 cm *vs.* 4.8–5.0 cm long) and thecae (4–5 mm *vs.* 7–8 mm long). The bracteoles are much longer (12.5 mm *vs.* 6 mm long), long-acuminate to lanceolate (*vs.* obtuse to acute), with pilose margins (*vs.* glandular-fimbriate), which are located near the base of the pedicel (*vs.* just below the middle) (Luteyn 1996).

Additional specimens examined (paratype):—ECUADOR. Morona-Santiago: Gualaquiza, 1765 m, 28 January 2023, H. Garzón, M. Jiménez & C. Villalta 173 (HUTPL 14789!).

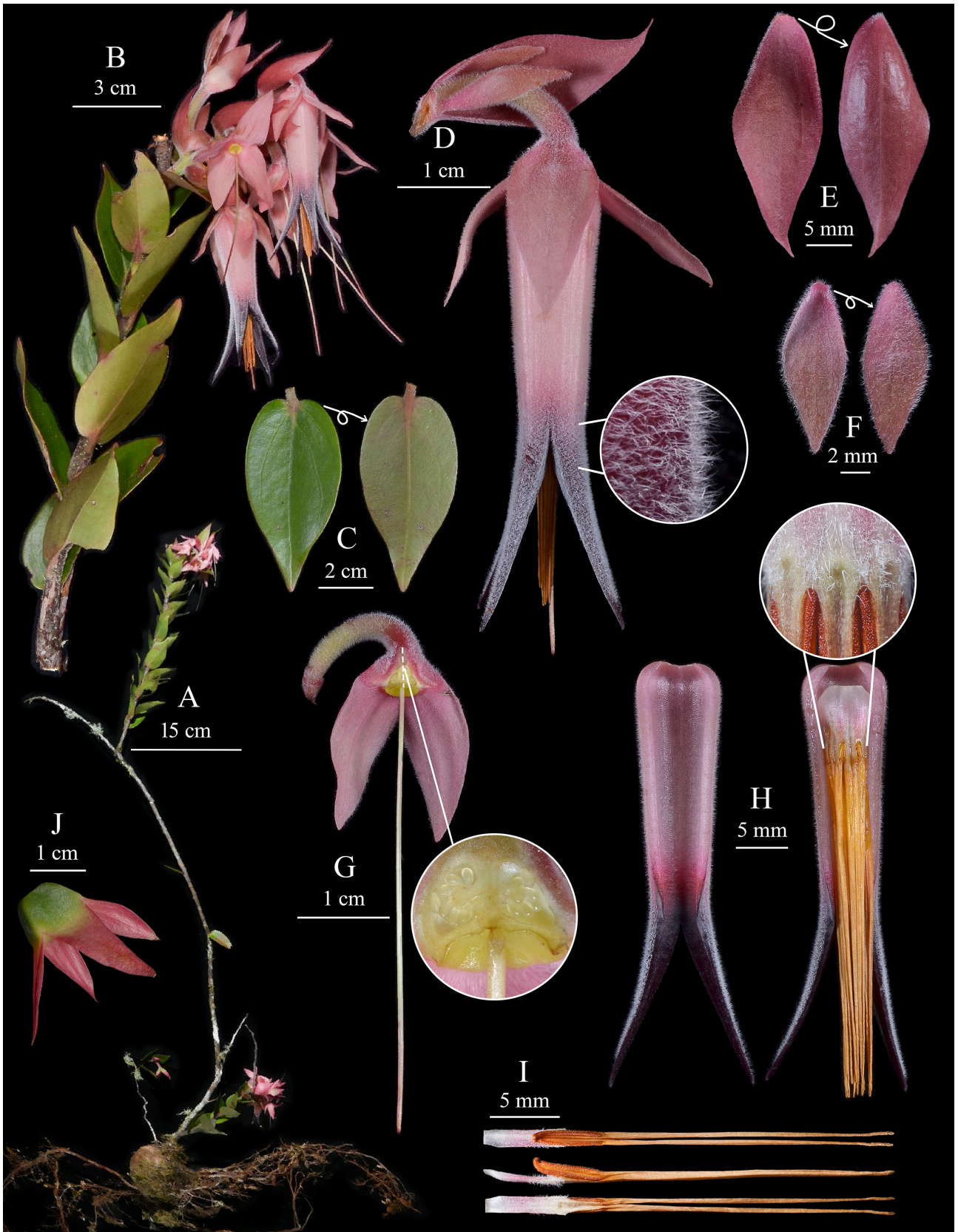


FIGURE 1. Lankester Composite Dissection Plate (LCDP) of *Ceratostema jorgebritoi*. A. Habit. B. Terminal branch and inflorescence. C. Leaves in adaxial and abaxial views. D. Flower with floral bract and bracteoles and a close-up of the corolla indumentum. E. Floral bract in adaxial and abaxial views. F. Bracteole in adaxial and abaxial views. G. Longitudinal section of the calyx and ovary showing pedicel and style. H. Longitudinal section of the corolla with a close-up of the junction of the filaments and thecae. I. Stamens, ventral (uppermost), lateral (middle) and dorsal (lowermost) views. J. Nearly mature fruit. Elaborated by Henry X. Garzón-Suárez based on photographs of the type.

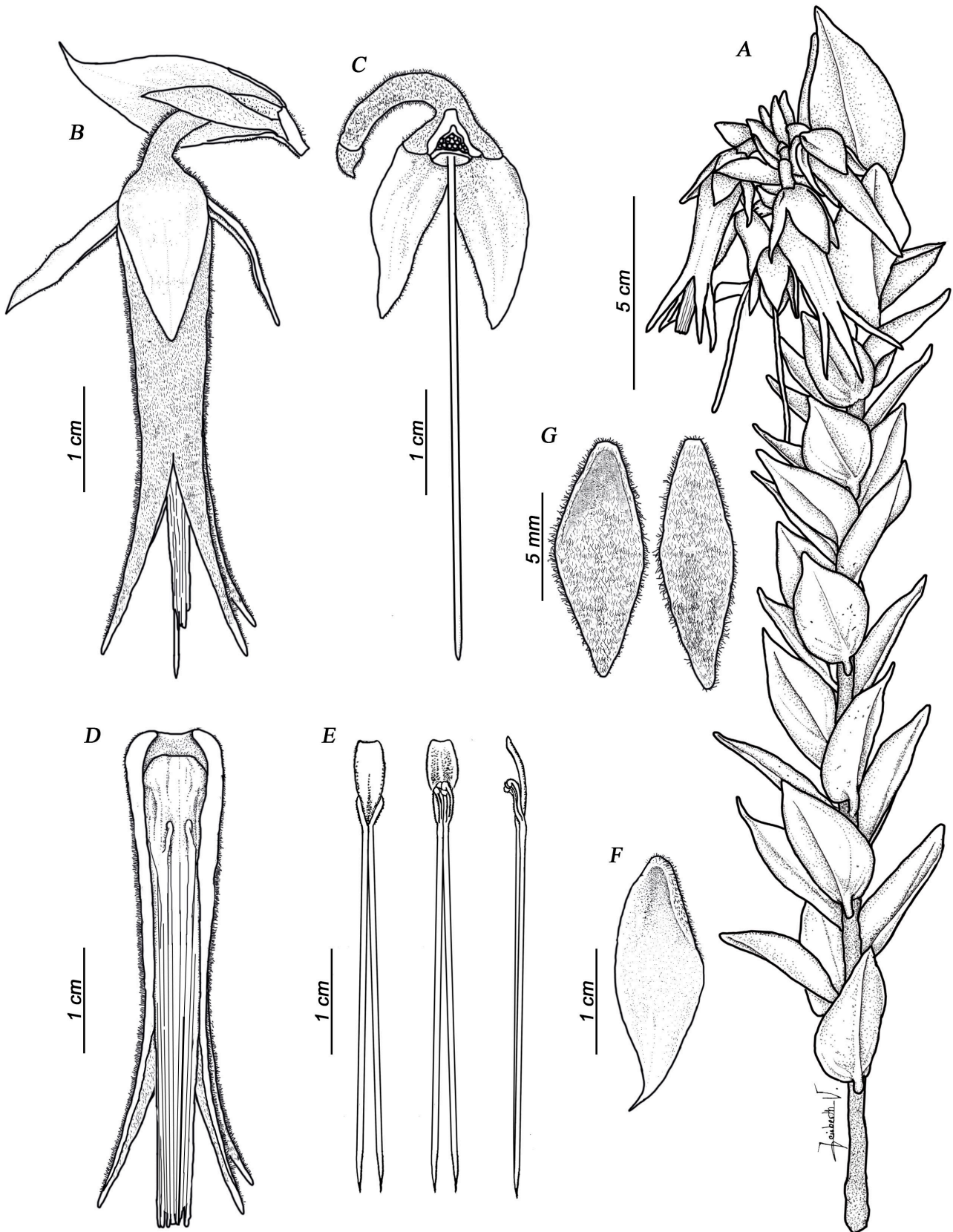


FIGURE 2. Line drawing of *Ceratostema Jorgebritoi*. A. Habit. B. Flower. C. Longitudinal section of the calyx showing ovary and pistil. D. Longitudinal section of the corolla showing stamens. E. Stamens, ventral (leftmost), dorsal (middle) and lateral (rightmost) views. F. Floral bract, abaxial view. G. Bracteoles, adaxial and abaxial views. Drawing by Leisberth Véllez-Abarca based on the type.

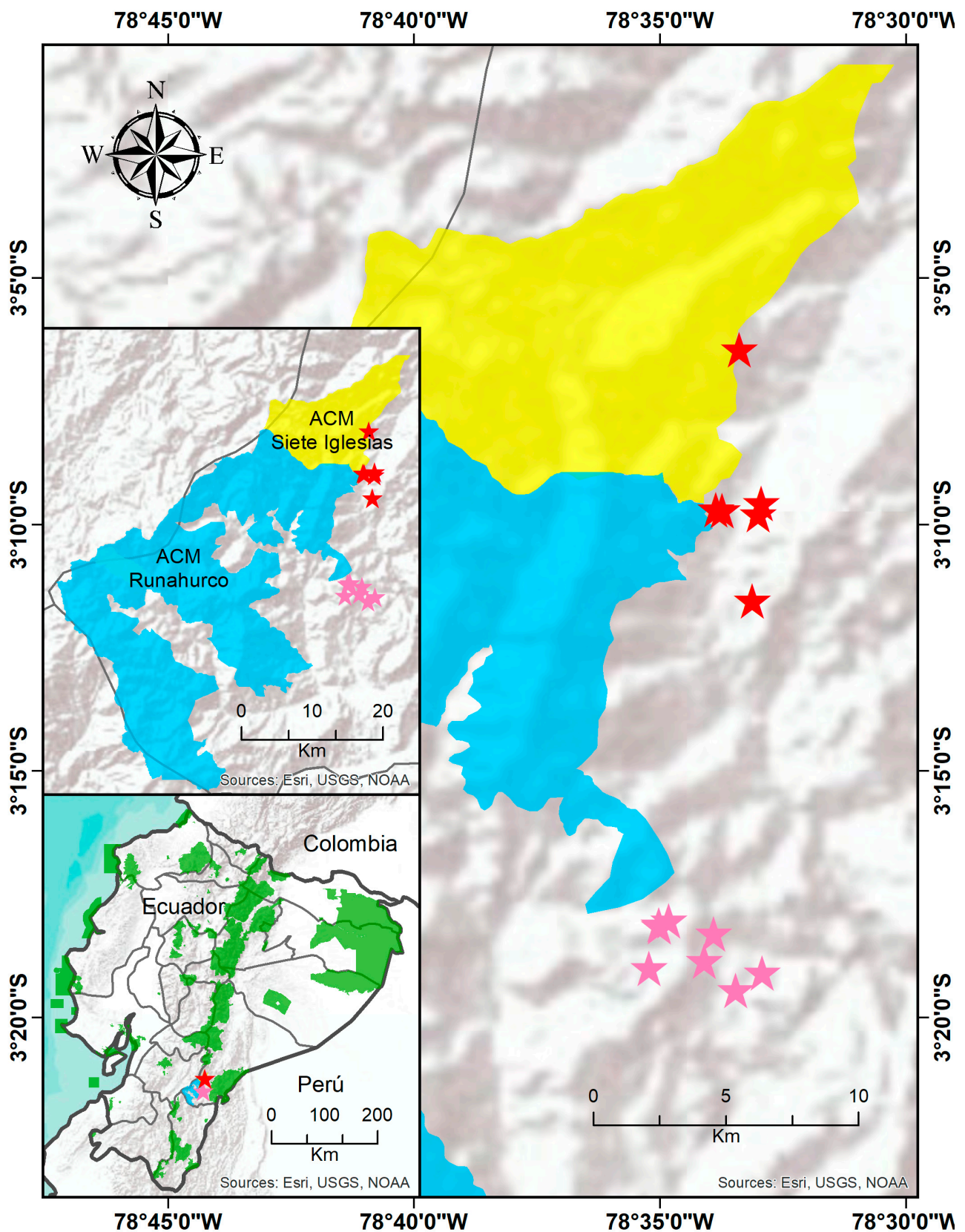


FIGURE 3. Distribution of *Ceratostema jorgebritoi* (pink star) and *C. sieteiglesiana* (red star) in the southern region of Morona-Santiago, southeast of Ecuador. Prepared using ArcGIS.



FIGURE 4. *Cerarostema jorgebritoi* in situ. A. Habitat. B. Habit. C., D. Inflorescences. Photographs by H. Garzón-Suárez.



FIGURE 5. Holotypes of *Ceratostema Jorgebritoi* (left) and *C. flexuosum* (right). Holotype of *C. flexuosum* collected in Colombia, “Wood Rosario” by W. Lobb. Reproduced with the kind permission of the Royal Botanic Gardens, Kew.

2. *Ceratostema sieteiglesiana* H.Garzón & M.M.Jiménez, *sp. nov.* Figs. 3, 6–9.

Type:—ECUADOR. Morona-Santiago: San Juan Bosco, 1757 m, 3 February 2023, *H. Garzón & M. Jimenez 178* (holotype: HUTPL 14794!).

Diagnosis: The new species is similar to *Ceratostema zamorana* M.M.Jiménez & Vélez-Abarca, from which can be distinguished by the smaller leaves, 1.7–5.5 cm × 0.6–2.5 cm (vs. 7.7–12.7 cm × 3.7–6.5 cm), the sessile to very shortly-pedunculate inflorescences (vs. long-pedunculate), the puberulous floral parts (vs. pruinose), the shorter pedicels (1.9–2.7 cm vs. 2.2–4.1 cm long), subterete (vs. subquadrangular) in outline, subulate (vs. ovate) bracteoles, the longer calyx lobes (12.7–19.1 mm long vs. 11.3–12.5 mm long), with the sinuses and apices being acute (vs. acuminate), the longer corolla lobes (28–30 mm long vs. 15–16 mm long), externally black (vs. magenta), and the longer filaments (9.5–13.1 mm long vs. 4.5 mm long).

Pendant epiphytic *shrub*; axonomorphous roots with well-developed lignotubers, lignotubers subspherical to broadly fusiform, 10.5–25.6 × 10–22.5 cm in circumference. *Stems* terete to subterete, glabrous, slightly arching, up to 78 cm long, arising from the lignotuber, the bark dark brown, cracking longitudinally and exfoliating, twigs terete to subterete, sometimes bluntly angled, complanate or sharply ribbed, glabrous, striate after exfoliation, dark brown, up to 80 cm long, new twigs pale green sometimes suffused with magenta, minutely pubescent; axillary buds emerging up to 2 mm above the leaf node, compressed; bracts 2–3, long-triangular to subulate, 2.1–3.4 × 0.3–0.4 mm, acuminate at the apex, subtending the axillary bud. *Leaves* alternate, falcate to subfalcate; petioles pale greensuffused with pink, subterete, rugose, 2.1–5.2 × 1.0–2.0 mm, minutely pubescent; blades thickly-coriaceous, lanceolate to elliptic, 1.7–5.5 × 0.6–2.5 cm, dark green adaxially, paler abaxially, glabrous on both surfaces, slightly polished adaxially, centrally channeled, revolute, finely wrinkled, sometimes sub-bullate, base cuneate to shortly attenuate, extending down the petiole, apex obtuse or attenuate rarely acute, weakly plinerved with 2–3 pairs of secondary veins originating near the base, the

midrib thickened and impressed in the proximal 5 mm adaxially, raised and conspicuous abaxially, the secondary veins anastomose, plane adaxially and plane to weakly impressed abaxially, veinlets slightly raised, anastomose, reticulate adaxially. *Inflorescences* axillary, racemose, congested, 2–7-flowered, sessile to very short-pedunculate; peduncle terete, obconical, puberulous, pale green suffused with magenta, to 4.8 mm long; rachis subterete, 1.5–4.4 mm long, 2.3–3.4 mm thick, puberulous; floral bracts very short, triangular, obtuse, puberulous, caducous, 1.5–1.9 × 1.2–1.4 mm; pedicel incurved, pale green suffused with magenta, brown to the tip, puberulous, subterete, subverrucose and faintly ribbed from the bracteole to the apex, 1.9–2.7 cm long, 2.1–3.6 mm thick, puberulous, recessed in the calyx; bracteoles 2, small, located below the middle and opposite, caducous, long-triangular to shortly-subulate, 1.8–2.6 × 0.4–0.7 mm, puberulous, apex acuminate, margins slightly undulate. *Flowers* 5-merous, pendant; calyx 22.7–29.7 × 20.5–21.1 mm, puberulous, pink to brownish red with darker margins on the ribs and lobes, sometimes green at the hypanthium; *hypanthium* widely obconic, truncate, 5-winged, 8.3–9.8 × 3.6–6.1 mm; limb open, spreading, 15.9–17.2 × 22.7–29.7 mm; lobes 5, ovate, 5.0–6.5 × 12.7–19.1 mm, surface faintly veined and rugose rarely provided with up to four circular black glands, margins microscopically repand and involute, the apices and sinuses acute. *Corolla* thick-carnose, bistratose, cylindrical but narrowing distally, terete in cross-section, 4.8–5.2 cm long, 11 mm in diameter at the base and 9 mm in diameter at the throat, pink or salmon colored, puberulous, polished; *lobes* 5, incurved at the base, slightly recurved to the apex, spreading, narrowly triangular, acuminate, 28–30 × 5–6 mm, black with the base salmon externally, black internally, polished, channeled and subverrucose internally. *Stamens* 10, nearly equaling the corolla in overall length, each pair unequal with each other, 4.2–4.6 cm long; *filaments* connate, sparsely pilose abaxially at thecae height, 9.5–13.1 mm long; anthers 3.6–4.0 cm long overall, thecae 6–7 mm long, conspicuously papillose, tubules distinct, but seemingly connate near the proximal 2/3, glabrous, 3.1–3.3 cm long, dehiscent by terminal pores 1.1 mm long; *style* exerted, 5.4–5.7 cm long, glabrous, green; *stigma* truncated. *Fruits* baccate, whitish-yellow, oblate, 1.5 × 1.1 cm in diameter, puberulous, with darkened ridges when ripe, apex with persistent calyx lobes.

Distribution and habitat:—*Ceratostema sieteglesiana* is endemic to the forests surrounding the town of San Juan Bosco in Morona-Santiago Province, Ecuador. According to Baéz *et al.* (2013) and Guevara & Josse (2013), the type of forest of this area is classified as evergreen lower montane and premontane forest at the southeastern Cordillera of the Andes (BSBN02 & BsPn04). The new species was found at elevations between 1500–1700 m, where the type locality shows a stratified forest containing trees and treelets covered in mosses and lichens (Figs. 3, 8). The local species componentry is composed of other ericads such as *Anthopterus gentryi* Luteyn (1996: 390), *Ceratostema pendens* Luteyn (2005: 1272), *Disterigma utleyorum* Wilbur & Luteyn (in Luteyn & Wilbur 1977: 259) and *Spherospermum* spp., with local flora dominated by *Blakea subvaginata* Wurdack (1979: 347), *Cabralea canjerana* (Vellozo 1825: 176) Martius (1843: 38), *Ceratostema charianthum* Smith (1950: 360) and *Meriania neillii* Mendoza (2021: 85). Another specimen was observed in flowers approximately 10 km north and 500 m east from the type locality, and were vouchered with photographs shown in Fig. 8.

Conservation status:—*Ceratostema sieteglesiana* is known only from three locations which are near the Siete Iglesias Municipal Conservation Area (ACMSI), bordering the Runahurco Municipal Conservation Ecological Area (AECMR). Deforestation carried out for cattle pastures is acutely threatening the current habitat of the new species. Despite this, the authors believe *C. sieteglesiana* is protected because of its vicinity to the aforementioned municipal reserves, which are important nature preservation areas protected under local government treaties. Using the georeferenced material, the calculated extent of occurrence (EOO) for *C. sieteglesiana* is 8.03 km², with an area of occupancy (AOO) of 12 km². We recommend a conservation status of EN (Endangered) according to the criteria B2ab(i,ii) and C due to the very restricted area of occupancy of the species (IUCN 2022).

Etymology:—The new species is named after the Municipal Conservation Ecological Area Siete Iglesias (AECMSI), which marks the type locality of this rare species. This local reserve in southeastern Ecuador protects fragile and threatened ecosystems and is additionally important as a major resource for watercourses and springs. Dedicating the species after this reserve will aid in its scientific impact, environmental education, recovery of degraded areas, and ecotourism.

Taxonomic discussion:—Luteyn (1996) grouped the Ecuadorian species of *Ceratostema* that share a combination of unique features including the not amplexicaul leaves, the five-winged hypanthium with a very conspicuous calyx limb, and the lobes with lengths of 10 mm upwards. These traits apply to the following five species: *C. lanceolatum*, *C. megalobum*, *C. oellgaardii*, *C. reginaldii* and the recently described *C. zamorana* (Jiménez *et al.* 2021). The new species shares these defined traits, marking the sixth species belonging to this informal group. It is also worth considering that the axillary inflorescences and the small floral bracts and bracteoles are additionally common characters present in this morphological similar group, furthering a botanical relationship between the species in question.

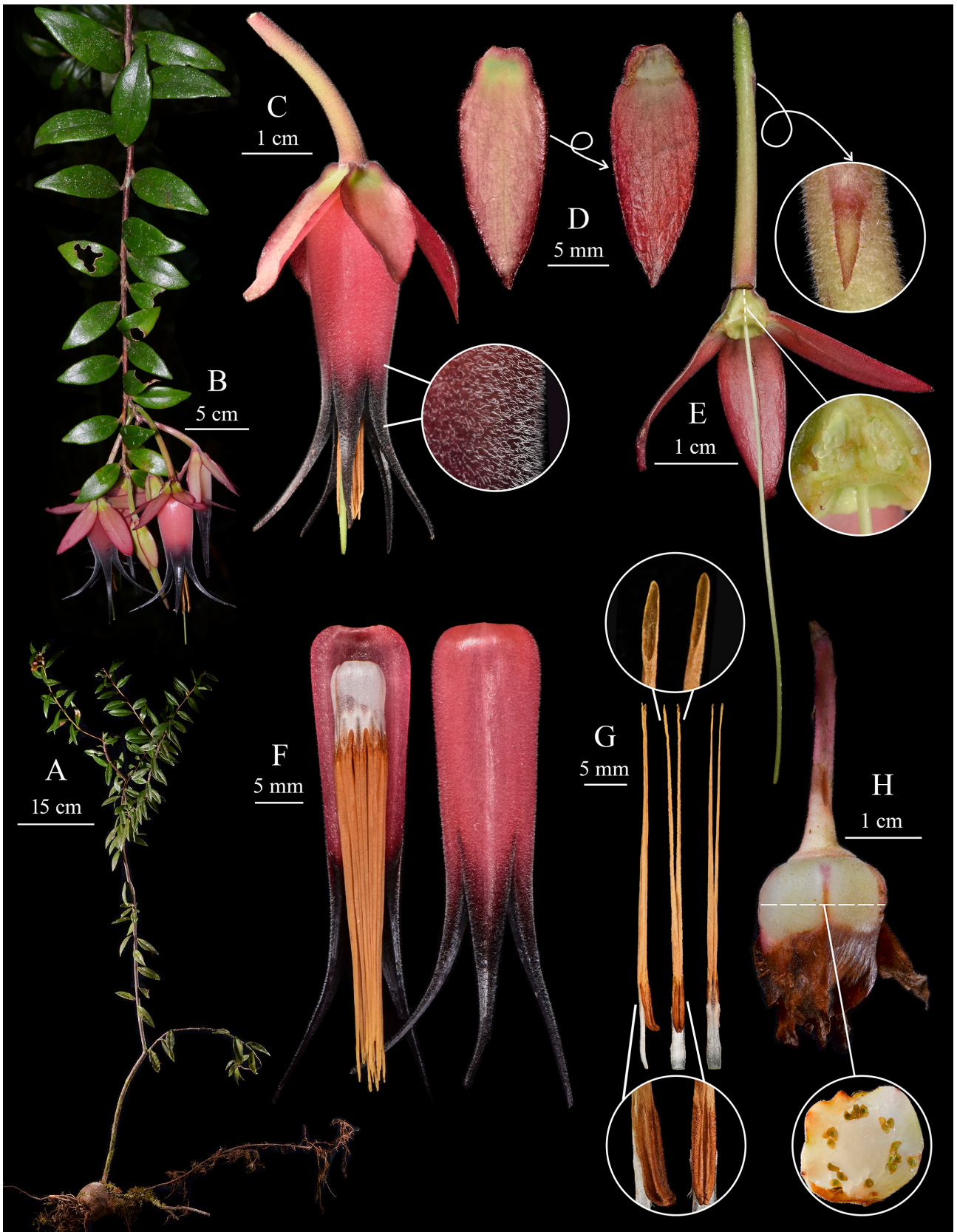


FIGURE 6. Lankester Composite Dissection Plate (LCDP) of *Ceratostema sieteglesiana*. A. Habit. B. Flowering branch. C. Flower with a close-up of the indumentum of the corolla. D. Lobes of the calyx, abaxial and adaxial views. E. Flower without corolla and a close-up of the longitudinal section of the calyx and bracteole. F. Corolla (right) and its longitudinal section (left). G. Stamens with a close-up of the thecae and pores of the tubules. H. Mature fruit and transversal section showing the seeds. Elaborated by Henry X. Garzón-Suárez based on photographs of the type.

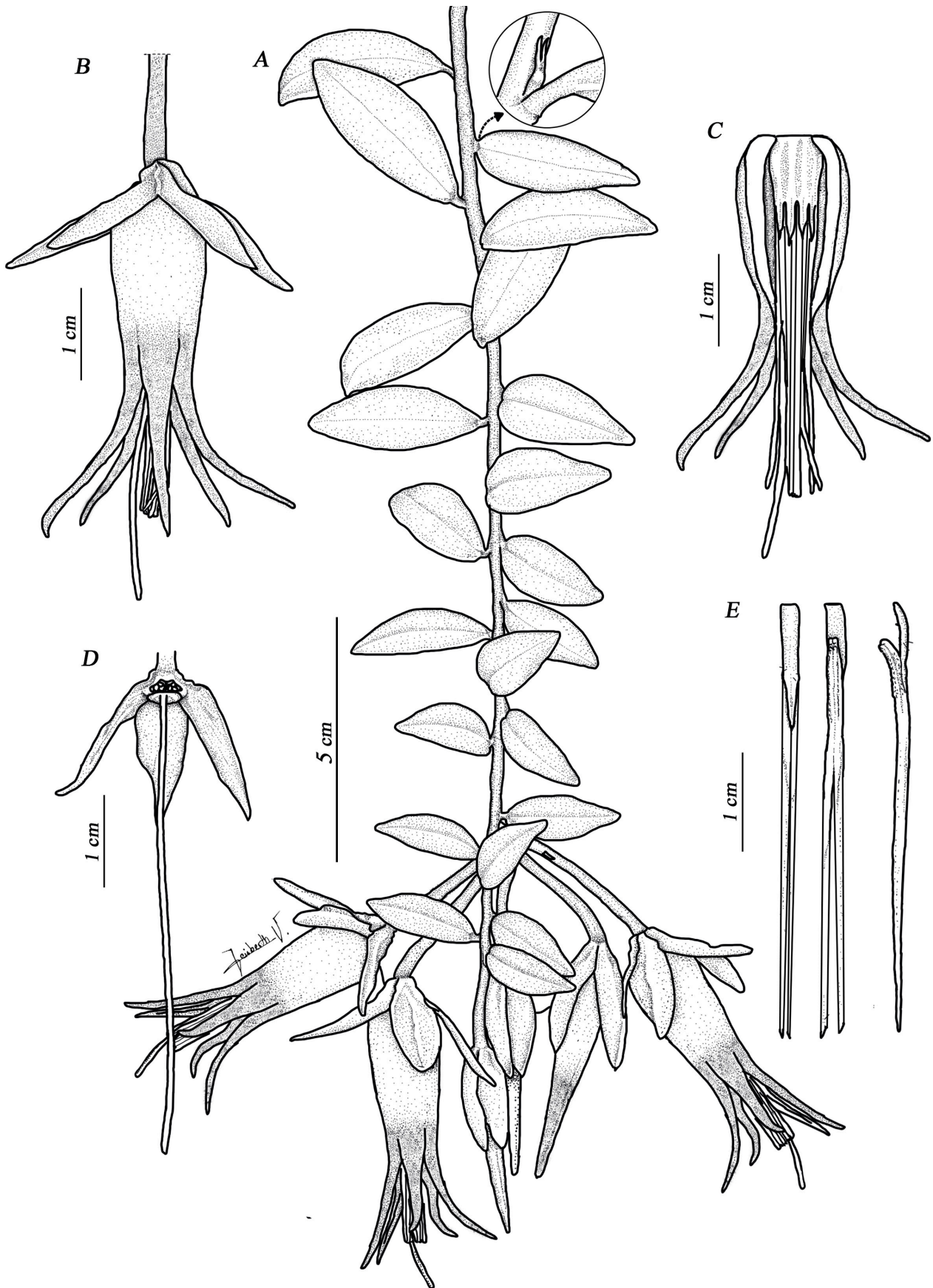


FIGURE 7. Line drawing of *Ceratostema sieteiglesiana*. A. Habit with a close-up of the axillary bud. B. Flower. C. Longitudinal section of the corolla showing the stamens. D. Longitudinal section of the calyx showing the calyx and pistil. E. Stamens, dorsal (leftmost), ventral (middle) and lateral (rightmost) views. Drawing by Leisberth Vélez-Abarca based on the type.



FIGURE 8. *Ceratostema sieteglesiana* in situ. A. Habitat. B. Flowering branch. C., D. Inflorescences. A, B, D. Photographs by H. Garzón-Suárez. C. Photograph by Daysy Vera.

Ceratostema sieteglesiana seems to be most similar to *C. zamorana* (Fig. 9), a species restricted to the premontane forests of Zamora, a town in the southeast of Ecuador. These two species are related by the glabrous, weakly plinerved leaves, with 3–5 pairs of secondary veins; the few-flowered inflorescences; the bracteoles located below the middle of the pedicel; the calyx limb remaining open with spreading ovate and acute lobes; and the cylindrical corolla. The corolla lobes of both species are narrowly triangular, acuminate at the apex, and internally black; with the staminal filaments being connate and the style exserted. The new species can be distinguished from *Ceratostema zamorana* by the lanceolate leaves (*vs.* ovate-lanceolate), the pink or salmon floral parts (*vs.* purplish brown and magenta), the subverrucose pedicels (*vs.* striate), the longer calyx (20.5–21.1 mm long *vs.* 12.4–14.6 mm long), the broadly obconic hypanthium (*vs.* obconic), and the longer corolla (4.8–5.2 cm long *vs.* 3.6–4.5 cm long). Additionally, the corolla lobes of the new species are markedly incurved (*vs.* spreading) (Jiménez *et al.* 2021).

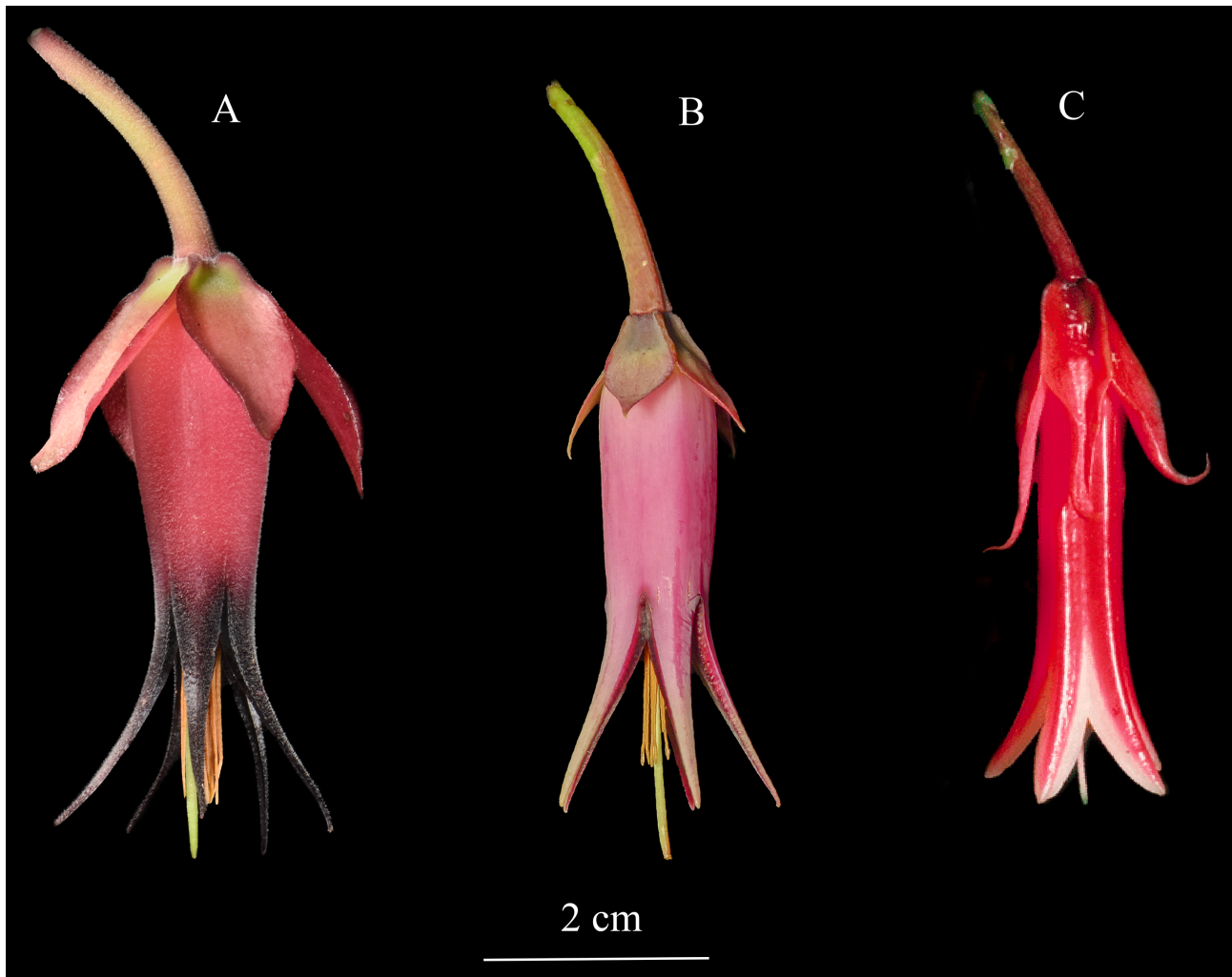


FIGURE 9. Species of *Ceratostema* with similar flowers. A. *Ceratostema sieteglesiana*. B. *C. zamorana*. C. *C. megalobum*. A. by Henry Garzón-Suárez. B. by Marco M. Jiménez. C. by G. Lewis.

Ceratostema sieteglesiana is also similar to *C. megalobum* (Fig. 9), a species endemic to the outskirts of Loja, in southern-central Ecuador. The two species share the glabrous, lanceolate leaves, the very shortly-pedunculate inflorescences, and the large calyx lobes; *C. sieteglesiana* differs by the plinerved leaves (*vs.* pinnately veined), the puberulous floral parts which are mostly pink or salmon colored (*vs.* glabrous and red colored), the broadly obconic hypanthium (*vs.* somewhat campanulate), the spreading, ovate calyx lobes (*vs.* erect-spreading, long-triangular), and the acute apex (*vs.* acuminate to incurved). The corolla of the new species is slightly longer (4.8–5.2 cm long *vs.* 4.0–4.5 cm long) with much longer lobes (28–30 mm long *vs.* 8–9 mm long), narrowly triangular-acuminate apices (*vs.* triangular), brownish-black in color, both externally and internally (*vs.* paler red outside and whitish inside), and the staminal filaments being connate (*vs.* distinct) (Luteyn 1996). A summary comparing the principal morphological differences between *C. sieteglesiana* and the other mentioned species is provided in Table 1.

TABLE 1. Summary of principal differences between *Ceratostema sieteglesiana*, *C. zamorana*, and *C. megalobum*.

Species	<i>C. sieteglesiana</i>	<i>C. zamorana</i>	<i>C. megalobum</i>
Leaves	1.7–5.5 × 0.6–2.5 cm, lanceolate to elliptic, apex obtuse to acute, plinerved with 2–3 pairs of secondary veins originating near the base	7.7–12.7 × 3.7–6.5 cm, ovate-lanceolate to elliptic, apex cuspidate to acuminate-caudate, weakly plinerved from near the base, with 3–5 pairs of secondary veins	4.0–6.0 × 1.0–2.0 cm, elliptic to oblong-elliptic, apex acuminate or acute, pinnately nerved with 2–3 pairs of secondary veins, ascending arcuate
Inflorescence	Floral parts puberulous, rachis 1.5–4.4 mm long	Floral parts glabrous and pruinose, rachis 2.6–3.3 cm long	Floral parts glabrous, rachis 1.0–4.0 cm long
Pedicel	Subterete, faintly ribbed, 1.9–2.7 cm long, puberulous	Subquadrangular, 2.2–4.1 cm long, pruinose	Subterete, ribbed, 1.7–2.5 cm long, glabrous
Bracteoles	Ovate to long-triangular, located below the middle	Ovate, located below the middle	Ovate, nearly basal
Hypanthium	Widely obconic, 5-winged, 3.6–6.1 mm long, greenish, limb open, spreading with ovate lobes, 12.7–19.1 mm long	Obconic, ribbed, 5.1–6.9 mm long, purplish brown, limb open, spreading with ovate lobes, 7.2–9.3 mm long	Somewhat campanulate, conspicuously winged, 5.0–6.0 mm long, red, limb erect-spreading, with triangular, long-acuminate lobes, 15.0–20.0 mm long
Corolla	Cylindric but narrowing distally, terete in cross-section, 4.8–5.2 cm long, pink or salmon colored, puberulous; lobes narrowly triangular, acuminate, 28.0–30.0 mm long, the lobes black with the base salmon externally, internally black	Cylindric but slightly narrowing distally, terete in cross-section, 3.6–4.5 cm long, magenta-colored, pruinose; lobes narrowly triangular, acuminate, 15.0–16.0 mm long, magenta externally, brownish-black inside	Cylindric and bluntly 5-angled, expanding slightly distally, 4.0–4.5 cm long, glabrous, red (fide label); lobes triangular, acute, 8.0–9.0 mm long, red externally, paler on the inside and outer margins of the lobes
Stamens	4.2–4.6 cm long, filaments connate, sparsely pilose to the base, 9.5–13.1 mm long; anthers 3.6–4.0 cm long, thecae 6–7 mm long	2.5–4.2 cm long, filaments connate, pilose at both sides, 4.5 mm long; anthers 3.0–3.3 cm long, thecae 6–8 mm long	4 cm long, filaments distinct, glabrous, ca. 4 mm long; anthers 3.45–3.5 cm long, thecae 10–11.5 mm long
Style	5.4–5.7 cm long	4.2–5.0 cm long	4.0–4.5 cm long

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