

A NEW SPECIES OF *BRACHIONIDIUM* (PLEUROTHALLINIDAE) FROM THE YANACHAGA CHEMILLEN NATIONAL PARK, PASCO, PERU

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ABSTRACT. A new *Brachionidium* from Peru is described and illustrated. The new species, *B. montieliae*, was discovered in one of the highest mountains of the Oxapampa-Ashaninka-Yanesha Biosphere Reserve (BIOAY), situated above the forests of the humid puna of the Yanachaga Chemillen National Park at 3590 m in elevation. It is similar to *Brachionidium vasquezii* but differs in the oblong-elliptic, denticulate, and semi-erect leaves, somewhat lanuginose abaxially; the purple lanuginose adaxially and papular abaxially, entire, acuminate lateral sepals; the purplish oblong-ovate dorsal sepal, lanuginose on the adaxial surface, papular abaxially; the purple petals with scalloped edges, acuminate to obtuse apex ending in a thin, slightly abbreviated tail; the lip with apiculate lateral angles and with a central, trapezoid verrucose callus on the disc. *Brachionidium montieliae* is a terrestrial species that thrives in the humid Puna forests at elevations around 3400–3600 meters. The ecosystem is characterized by a sclerophyllous forest with a diverse range of tree species. Information on distribution, ecology, etymology, and phenology is also included. There are potential threats from annual burning practices in the region. Given the potential risks, it is imperative to undertake immediate conservation measures and promote environmental awareness to safeguard this species.

RESUMEN. Se describe e ilustra un nuevo *Brachionidium* del Perú. La nueva especie, *B. montieliae*, fue descubierta en una de las montañas más altas de la Reserva de Biósfera Oxapampa-Asháninka-Yánesha (BIOAY), situada sobre los bosques de la puna húmeda del Parque Nacional Yanachaga Chemillén a 3590 m de elevación. Es similar a *Brachionidium vasquezii* pero se diferencia en las hojas oblongo-elípticas, denticuladas y semierectas, algo lanuginosas hacia el envés; los sépalos laterales púrpuras, con el borde entero, acuminados, lanuginosos hacia el haz y papulados hacia el envés; el sépalo dorsal oblongo-ovado de color púrpura, lanuginoso hacia el haz y papulado hacia el envés; los pétalos púrpuras, bordes festoneados, con el ápice acuminado obtuso, terminando en una cola delgada y corta; el labelo con los ángulos laterales apiculados, con un callo central, trapecoide y verrucoso sobre el disco. *Brachionidium montieliae* es una especie terrestre que prospera en los bosques de puna húmeda entre los 3400 a 3600 metros de elevación. El ecosistema se caracteriza por ser un bosque esclerófilo con una gran diversidad de especies arbóreas. También se incluye información sobre distribución, ecología, etimología y fenología. Existen amenazas potenciales por las prácticas de quema anual en la región. Dados los riesgos potenciales, es imperativo emprender medidas de conservación inmediatas y promover la conciencia ambiental para salvaguardar esta especie.

KEYWORDS / PALABRAS CLAVE: bidentate stigma, biosphere reserve Oxapampa–Ashaninka–Yanesha, bosque de puna húmeda, *Brachionidium montieliae*, callo trapecoidal, claviform pollinia (8), polinias claviformes (8), reserva de biosfera Oxapampa–Ashaninka–Yanesha, trapezoid callus, wet puna forest

Introduction. *Brachionidium* Lindl. is a Neotropical genus (Zelenko & Bermudez 2009), ranging from the West Indies and Central America from Guatemala to Panama, and South America, from Venezuela, Colombia, Ecuador, Peru, Bolivia, to Brazil (Bogarín & Karremans 2016).

Brachionidium species share the apical anther and stigma with several other genera within the subtribe Pleurothallidinae, including *Platystele* Schltr., *Pleurothallis* R.Br., and *Stelis* Sw. However, these genera are not closely related to *Brachionidium*, and that morphological feature is homoplastic (Pridgeon

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2005). Nevertheless, the genus forms a monophyletic and easily recognized group within Pleurothallidinae and has not experienced nomenclatural changes, unlike other other genera in the subtribe (Pridgeon 2005).

Plants of the genus are perennial with erect or repent ramicauls, lacking pseudobulbs, and having single leaf ramicauls covered by a short, glabrous, scaly sheath. The inflorescences are solitary with non-resupinate flowers featuring prominent sepals, smaller petals, and a small lip, which may be simple or 3-lobed. The column is short and robust with a bidentate apical margin. Anthers contain 6–8 clavate or elongate-pyriform pollinia; the stigma is transversely bilobed (Lindley 1859, Luer 1995).

In Peru, plants of *Brachionidium* are typically found in humid Puna and montane forests, thriving at elevations between 1800–4000 m (Valenzuela Gamarra 2017). The first recorded species of *Brachionidium* in Peru dates to 1911 when Schlechter documented *B. serratum* Schltr. (Schweinfurth 1959). In 1956, *B. phalangiferum* was reported by Leslie Garay from the province of Paucartambo in the Cusco region (Schweinfurth 1970). A systematic study by Luer in 1995 identified 64 *Brachionidium* species in Tropical America, including seven in Peru. Subsequent discoveries include *B. muscosum* Luer & Hirtz in 2000, which ceased to be endemic to Bolivia, and *B. machupicchuense* Christenson in 2002, reported as a new species endemic to the Cusco region. In 2005, Becerra registered three new species in the Pasco region: *B. gonzalesii* Becerra, *B. quator* Becerra, and *B. yanachagaense* Becerra.

The number of *Brachionidium* species recorded in Peru has steadily increased over the years, mirroring the broader trend of increasing species registrations in the Neotropics. Approximately four years later, Zelenko and Bermudez (2009) recorded 72 species, of which 23 were identified for Peru, excluding those previously cited by Becerra (2005). Subsequent research, such as the work by Bogarín *et al.* (2015), Jiménez (2015), and Bogarín & Karremans (2016), revealed 82 *Brachionidium* species, with 21 found in Peru. Later, Valenzuela Gamarra (2017) recorded 81 species in the genus, including 22 in Peru, which accounts for the newly discovered *Brachionidium puiquiensis* L.Valenz. A more comprehensive study conducted by Goicochea *et al.* (2019) recorded 24

Brachionidium species for Peru, further enriching our understanding of the genus's diversity in the region.

Currently, according to recent inquiries conducted in online databases like Tropicos (2023), Catalog of Life (Bánki *et al.* 2023), Checklist of the Global Biodiversity Information System (GBIF 2023), and the International Plant Names Index (IPNI 2023), the genus *Brachionidium* comprises 84 species, with 29 of them documented in Peru, including the new species added in this article. It is worth noting that this number of *Brachionidium* species will likely continue growing as unexplored areas are studied. These research efforts play a vital role in unveiling *Brachionidium* species' diversity and understanding their populations, phenological states, and important biological and ecological aspects. Ultimately, this knowledge contributes to developing sustainable management and conservation plans over time.

Materials and methods. In one of the botanical explorations conducted within the Yanachaga Chemillén National Park, as part of the 'Floristic diversity of the natural protected areas of Peru' project, a previously undocumented *Brachionidium* species was discovered. A specific set of procedures was followed to document this discovery. First, images of the overall habit and detailed floral parts were captured using a Panasonic Lumix AVCHD progressive DMC-ZS50 digital camera (12MP 50x). Careful observations were then conducted to document the morphological characteristics. Additionally, measurements of various floral parts were taken using the same digital camera. Flowers were placed in jars containing an alcohol solution (60%), water (30%), and glycerin (10%) for further study. The description of the new species is based on the collected materials from the Yanachaga Chemillén National Park, specifically in the Santa Bárbara peasant community of the Huancabamba district, Oxapampa province, Pasco region, Peru. The botanical collections from this exploration were deposited in the HOXA, USM, and MO herbaria.

To aid in the identification process, a species key for the genus, as proposed by Luer (1995), with additional insights from Becerra (2005), Becerra & Catchpole (2007), Luer (2010), Luer & Thorerle (2012), Bogarín *et al.* (2015), Bogarín & Karremans (2016), Jiménez (2015), and Valenzuela Gamarra

(2017), was employed. For a detailed examination of the vegetative parts, an Olympus Stereo Zoom SZ4045 stereoscope with a magnification range from 6.7 to 40x, a Leica DM 300 optical microscope (150x), and a Celestron 44302B Digital Microscope (250x) were used. Detailed drawings were created for each observed detail, facilitating comparisons and discussions. Finally, the geographic coordinates of the discovery site were recorded using a GPS 64 CSX to understand the species' distribution better.

TAXONOMIC TREATMENT

Brachionidium montieliae L. Valenz., *sp. nov.* (Fig. 1–2)

TYPE: Peru. Pasco: Huancabamba, Peasant Community of Santa Barbara, Yanachaga Chemillen National Park, Montane Forest 3590 m, S 10°20'41.84", W 075°38'15.18", 12–VIII–2020. *L. Valenzuela 38652*, *T. Aronson*, *R. Zehnder*, *M. Aquino*, *C. Romero*, *A. Alanya* (holotype: HOXA; isotype: USM, MO).

DIAGNOSIS: *Brachionidium montieliae* is similar to *B. vasquezii*, but the former presents semi-erect, oblong-elliptic, denticulate leaves, 2.0–3.5 × 0.5–0.7 cm; terete petiole 2.0–2.2 mm long (vs. leaves erect, coriaceous, elliptic, acute, apiculate, 1.5–2.5 × 0.5–0.8 cm, cuneate base on petiole 1–3 mm long). Lateral sepals, purple, fleshy, 5 veined, acuminate in a short 2 mm long tail, separated towards the apex by 1 mm (vs. pink sepals translucent with purple veins, completely connate, 4-veined), the middle sepal purple, slightly oblong-ovate, 12 × 8 mm, acuminate in a short 1.7–1.8 mm tail (vs. middle sepal broadly ovate, 15 × 9 mm, the apex obtuse acuminate into a short 2 mm long tail). Petals purple, entire scalloped edge, 12 × 6 mm, apex obtuse acuminate into a slender, slightly short tail 3 mm long (vs. translucent pink, purple-veined, short ciliate petals 13 × 7 mm, apex obtuse, acuminate into a short 2 mm long tail). Labellum 5.5–6.0 × 2.8–3.0 mm, lateral angles acute, disc with a central, trapezoidal, verrucous callus (vs. labellum 2.5 × 5.0 mm, the lateral angles obtuse, curved, the disc with a central callus, ovoid, minutely pubescent).

Terrestrial herb up to 30 cm long, erect. *Rhizome* slender 1.8–2.0 mm thick. *Ramicauls* 0.5–1.5 cm long, spaced 2.0–2.5 cm apart, covered by 2 apiculate, translucent, slightly warty funnel-shaped sheaths, the basal sheath 9.0 × 2.0–2.3 mm, and the apical sheath

13.6 × 1.2–2.3 mm. *Roots* slender, fasciculate, 1.2 mm thick, arising from the nodes that give rise to the twigs. *Leaves* semi-erect, oblong-elliptic, cuneate base, denticulate, apiculate, 2.0–3.5 × 0.5–0.7 cm, somewhat lanuginose towards the underside, 7 veins, with the apiculus 1 mm long; terete petiole 2.0–2.2 mm long. Single-flowered terminal *inflorescence*, erect, purple, floral peduncle 6.6–9.0 cm × 0.7–0.8 mm, with 2 apiculate tubular bracts, one located in the middle of the peduncle and the other at its base, 9.0 × 1.0–2.2 mm; funnel-shaped floral bract, slightly verrucose, strongly acuminate or apiculate, 4 × 5 mm in the apical part and only up to 1 mm wide in the basal part, apiculus measures 1.3 mm long that surrounds the pedicel, and the 6 mm long, verrucose, green, with purple spots, remains of the axis which fits perfectly on the dorsal part of the lateral sepals of the flower. Robust trapezoid *ovary* 2.0–3.0 × 1.2–2.0 mm, slightly verrucose. *Pedicel* short, terete, 1.0–1.2 mm long. *Flowers* purple, not resupinate, 2.5–2.8 cm in diameter. *Sepals* purple, conspicuously fleshy; the lateral sepals connate in an ovate synsepal 13 × 9 mm long, apex acuminate in a short 2 mm long tail, separated (bifid) towards the apex by 1 mm, with entire margin, not scallop, 5 veins, lanuginose towards the adaxial surface and minutely papulate towards the abaxial surface with the presence of some scattered whitish hairs; dorsal sepal slightly oblong-ovate, 12 × 8 mm, 3 veins, apex acuminate into a 1.7–1.8 mm short tail, twisted to the left; entire margin not scalloped, lanuginose towards adaxial surface, papular towards abaxial surface, hairy scattered whites. *Petals* purple, entire edge scalloped, with the base in narrow, elliptic 12 × 6 mm length 3 veins, obtuse apex acuminate into a thin and slightly short 3 mm long tail. *Lip* purple transversely oblong-elliptic, concave, seen from above; transversely cordate, seen from the front, 5.5–6.0 × 2.8–3.0 mm, the lateral angles acute, curved, the apex broadly rounded, strongly apiculate, acute triangular apicle 0.5–0.6 mm, marginally callous, with the margin flattened, disc with a central, trapezoidal, verrucous callus 1.6–1.7 × 1.2–1.3 mm, with a glenion. *Column* yellow, short, stout, terete, 2.3–2.4 × 2.0 mm long, with apical anther and stigma, the latter bilobed, each one with an acute tooth. Pyriform yellow *anther cap* 1.3–1.4 mm long. *Pollinia* 8, claviform, 4 largest 1.2 mm long, 4 smallest 0.7 mm long, yellow. Capsular *fruits* with six ribs 1.5–1.8 × 0.7–0.8 cm.

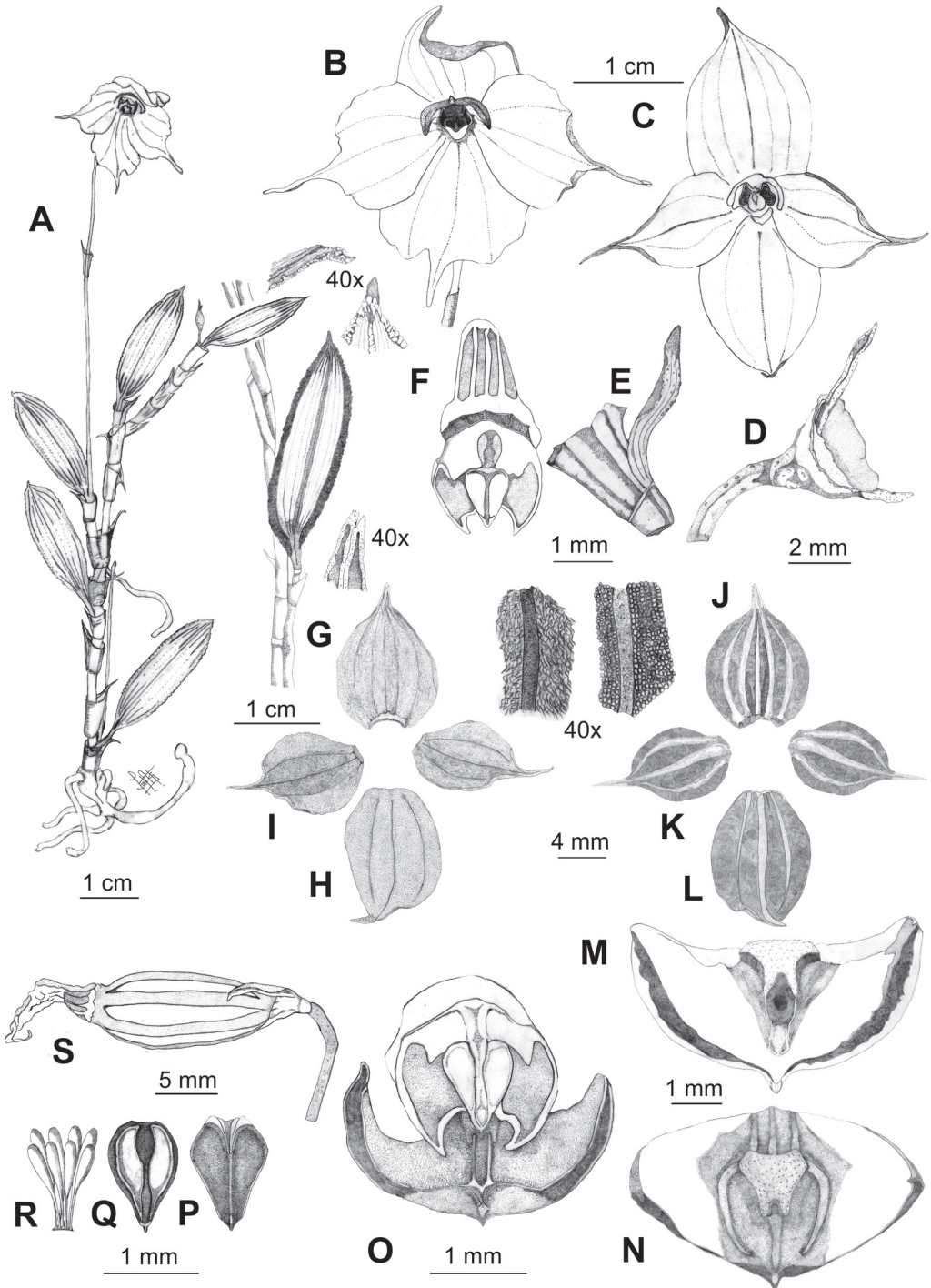


FIGURE 1. *Brachionidium montieliae* L.Valenz. A. Habit. B. Flower seen from the front, natural position. C. Flower, flattened perianth. D. Floral bract. E. Ovary and remains of the axis. F. Column and Ovary. G. Lateral sepals. H. Middle sepal. I. Petals (adaxial). J. Lateral sepals. K. Dorsal sepal. L. Petals (abaxial). M. Lip (front). N. Lip (adaxial). O. Lip, column, and pollinarium. P. Anther cap (dorsal), Q. Anther cap (ventral). R. Pollinarium. S. Fruit. Drawn from the holotype by L. Valenzuela.

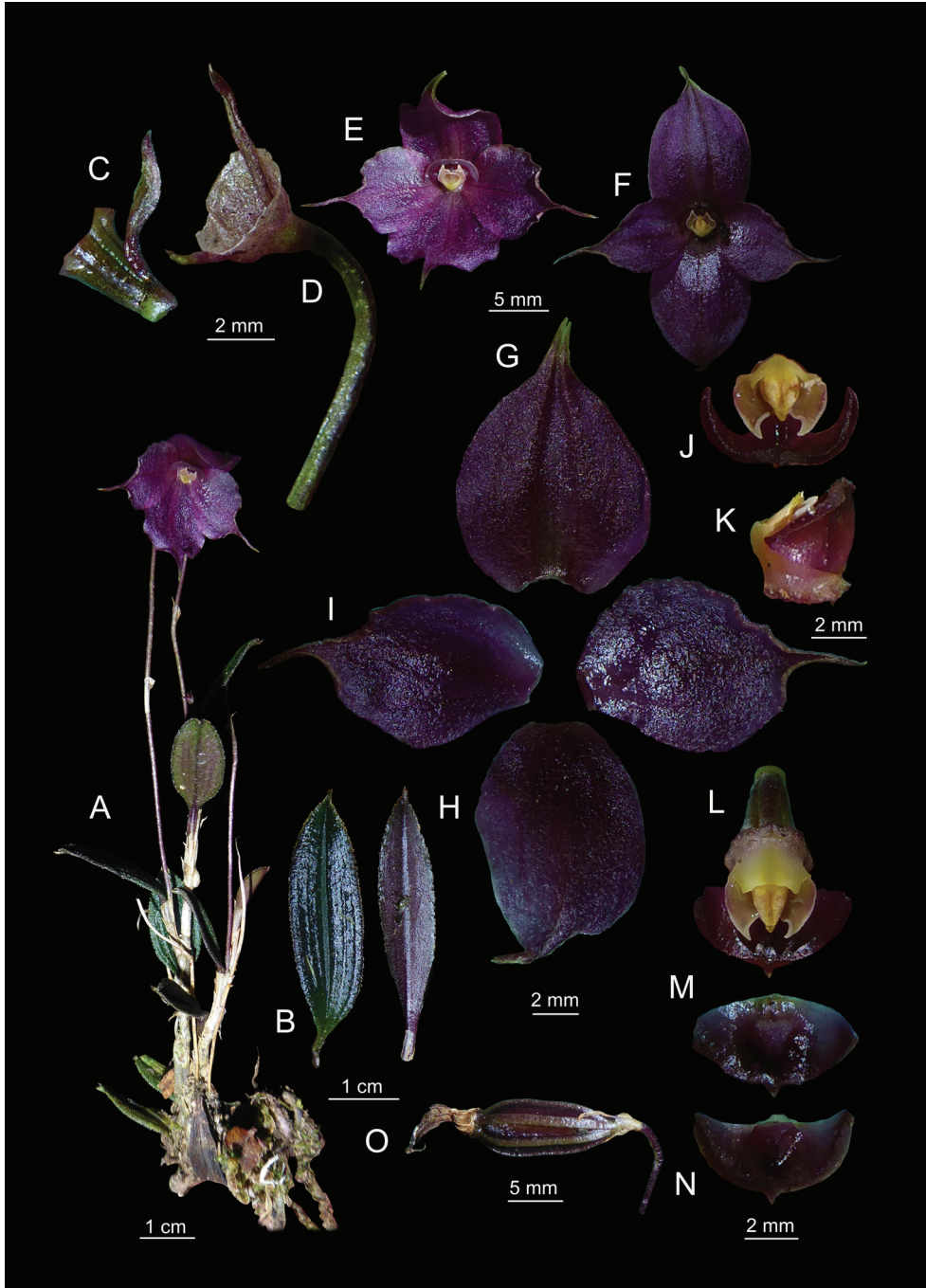


FIGURE 2. *Brachionidium montieliae* L.Valenz. **A.** Habit. **B.** Leaves (adaxial, abaxial). **C.** Ovary, and remains of the axis. **D.** Apical segment of the peduncle, bract of the flower, and remains of the axis. **E.** Non-resupinated flower, normal position. **F.** Non-resupinated flower with extended flower parts. **G.** Lateral sepals (tail forked). **H.** Dorsal sepal. **I.** Petals. **J.** Column, lip, and pollinarium (front view). **K.** Lip and column (profile view). **L.** Ovary, column, pollinarium and lip (dorsal view). **M.** Lip with trapezoid central callus (adaxial view). **N.** Lip with central callus (view from above). **O.** Fruit. Photographs from the holotype by L. Valenzuela.

DISTRIBUTION AND ECOLOGY: The new species is currently known only from the Yanachaga Chemillen National Park, near the Peasant Community of Santa Bárbara, in the Huancabamba district of the Oxapampa province, situated within the BIOAY. The orchid plant, which has a rhizomatous growth pattern, typically forms small groups consisting of 2–3 individuals. It was discovered in a humid Puna forest, located above the tree line and thriving in the shade of a thorny scrub forest. The habitat of this species can be described as a shaded and somewhat rocky environment where a diverse sclerophyllous forest is found. This habitat is characterized by the presence of several predominant tree species, including *Ilex* spp. (Aquifoliaceae), *Gaultheria* spp., *Bejaria aestuans* Mutis ex L. (Ericaceae), *Diplostephium* spp. (Asteraceae), *Myrsine* spp. (Primulaceae), *Escallonia myrtilloides* L.f. (Escalloniaceae), *Brunella* spp. (Brunellaceae), *Saracha punctata* Ruiz & Pav. (Solanaceae), *Weinmannia cochensis* Hieron., *W. pentaphylla* Ruiz & Pav. (Cunoniaceae), *Symplocos robinfosteri* B.Stühl (Symplocaceae), *Andea* spp., *Ocotea* spp. (Lauraceae), among others.

PHENOLOGY: Plants of this species typically produce flowers during July and August.

NOTES ON *IN SITU* CONSERVATION: Regarding its conservation status, it is worth noting that the species may face a certain degree of threat. The town's local inhabitants regularly engage in annual burning practices very close to the protected area, primarily between June and August, believing that it improves pastures and enhances the quality of their livestock feed. Although these burnings occur within the buffer zone of the park, regrettably, we still consider them to pose a significant risk and a threat to the biodiversity of the area. As researchers, we strongly recommend that the Peruvian government urgently establish a connection with the Peasant Community of Santa Barbara. This connection could involve the creation of a surveillance post staffed by professional specialists who can collaborate on designing environmental awareness and education plans. Additionally, they can propose activities that promote knowledge, proper resource management, and sustainable use of the area's resources. This approach would simultaneously contribute to the conservation of the area.

ETYMOLOGY: The species is named in honor of Olga Martha Montiel in recognition of her significant contributions to science and research, particularly in the field of flora studies in Nicaragua. She has played an instrumental role in ongoing research efforts, publishing four volumes dedicated to the flora of Nicaragua. Presently, her photographic expertise and wealth of knowledge are being shared through the Missouri Botanical Garden (MBG) plant database, TROPICOS. Olga Martha served as Vice President and Director of the Center for Conservation and Sustainable Development at the Missouri Botanical Garden (MBG) from 2001 to 2022. She actively collaborated on various research and conservation projects throughout Latin America during her tenure. Her professional and philanthropic work aligns seamlessly as she forges worldwide partnerships to enhance conservation capacity.

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