Revista
Q'EUÑA ISSN: 2708-2660 (Ele), 2412-2297 (Imp)

Articulo Original

Citación: Huaylla *et al.* (2022). *Mastigostyla moqueguensis* (Tigridieae: Iridaceae), una nueva especie del Sur del Perú Rev. Q'EUÑA 13(1): 07- 13

https://doi.org/10.51343/rq.v13i1.1012

Recibido: Diciembre 19, 2021
Aceptado: Junio 15, 2022
Publicado: Julio 12, 2022

Declaración de disponibilidad de datos: Todos los datos relevantes están dentro del documento y sus archivos de información de respaldo.

Conflicto de intereses: Los autores declaran no tener ningún conflicto de intereses.

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Mastigostyla moqueguensis (Tigridieae: Iridaceae), a new species from southern Peru

Mastigostyla moqueguensis (Tigridieae: Iridaceae), una nueva especie del Sur del Perú

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Abstract
A new species, *Mastigostyla moqueguensis* Huaylla & Llalla, is described from the Andes of Moquegua in southern Peru. *Mastigostyla,* which belongs to the tribe Tigridieae, is widely distributed in the Puna and Andean dry valleys of southern Peru and central Bolivia. The new species can be recognized by its ovate-lanceolate, acute inner tepals with glands at the base. It shows some affinity with *M. torotoroensis* because of the filiform, bifid style arms with apical stigmas. We present photographs and a table highlighting differences between the new specie and some similar species.
Keywords: Andes, endemism, *Mastigostyla*, Moquegua

Resumen
Se describe una nueva especie de los Andes, *Mastigostyla moqueguensis* Huaylla & Llalla, del departamento de Moquegua en el sur de Perú. *Mastigostyla* pertenece a la tribu Tigridieae, es más diversa en la Puna y los valles secos andinos del sur de Perú y el centro de Bolivia. La nueva especie puede ser reconocida por sus tépalos internos agudos, ovado-lanceolados, con glándulas en la base. Tiene una cierta afinidad con *M. torotoroensis d*ebido a las ramas de estilo bífido, filiformes con estigmas apicales. Se presenta fotografías y una tabla comparando las diferencias entre la especie nueva y algunas especies similares.

Palabras claves: Andes, endemismo, *Mastigostyla*, Moquegua

Introduction

The Iridoideae subfamily of the Iridaceae belongs to the order Asparagales (APG IV - Byng et al., 2016) and consists of five tribes, one of which, Tigridieae, is represented in Peru by six genus: *Cardenanthus* R.C.Foster, *Cypella* Herb., *Ennealophus* N.E.Br., *Hesperoxiphion* Baker, *Mastigostyla* I.M. Johnst and *Tigridia* Juss. (León, 2006). A complete revision using an evolutionary focus is needed. Clade B of the Tigridieae (Chauveau et al., 2012) was investigated phylogenetically with significant sampling of *Mastigostyla* and *Cardenanthus* R.C.Foster. The molecular sequencing support that *Cardenanthus* should be included in *Mastigostyla. Tigridia philippiana* I.M. Johnst should also beincluded in *Mastigostyla* based on both molecular studies and its morphological features (Goldblat & Manning 2008; Chauveau et al., 2012; Celis Pacheco, 2012; Huaylla, 2015; Donadío et al., 2016).

Mastigostyla is endemic to the Andes actually consists of 23 species distributed in Argentina (7), Bolivia (9), Chile (1) and Peru (8), growing exclusively in the puna xerophytic vegetation, Prepuna and Andean Valleys between 2700 - 4500 meters of elevation (Huaylla, 2015). *Mastigostyla* is characterized by the subterranean or aerial flowering stems having blue or white flowers with irregular dark blue marks and a yellow base, united or free tepals, the inner white and blue or dark blue, with or without glands, filaments united into a staminal column, bifid or branched style branches, with or without shorter lateral crests, with or without an apical stigma (Goldblatt & Manning 2008; Huaylla, 2015).

During field work in Moquegua (Peru), a new species was found and here is described, illustrated and its conservation status evaluated.

Materials and Methods

The collected specimens of *Mastigostyla* were compared with the type specimens of morphologically similar species at BOLV, CUZ, HSB, K, LIL, LPB, MCNS, MO, MOQ, QCA, QCNE, USM and USZ herbaria. Comparison of the new species with living specimens collected of *M. boliviensis* (R.C.Foster) Goldblatt, *M. torotoroensis* Huaylla & Wilkin and *M. tunariensis* (R.C.Foster) Ravenna have being done. For *M. coronata* we consulted online records of the Instituto de Botánica Darwinion (http://www.darwin.edu.ar/proyectos/floraargentina/fa.htm).

Voucher specimens from Peru were deposited at the herbario MOQ, CUZ and USM, herbaria, acronyms according to Thiers (2020).

Measurements and illustrations of floral details were prepared from live plants observed in the field and in the laboratory with a stereomicroscope. The distribution map was prepared using the program Arc GIS 10.3 software (ESRI, 2015), based on the coordinates obtained in the field.

Taxonomic treatment

Mastigostyla moqueguensis Huaylla & Llalla, sp. nov. Type – Perú. Moquegua: Prov. Mariscal Nieto: Entre el peaje Cuellar y el Ponton Cuellar, 17°00'13"S; 70°42'55"W, alt. 3705 m, 15 March 2020 (observed in flower and fruit). H. Huaylla, O. Llalla & A. Manchego 4559 MOQ00691 (holotype: MOQ!; isotypes: CUZ!). Figure 1-2.

Diagnosis: *Mastigostyla moqueguensis* differs from *M. torotoroensis* Huaylla & Wilkin (Fig. 2 D-E) in color ivory-white (*vs*. blue with a white blotch at the base)); by inner tepals ovate-lanceolate, 10 × 2 mm (*vs*. oblong-lanceolate, 8–11 × 2–3 mm); it differs from *M. venturii* (R.C.Foster) Ravenna (Fig. 3 H-I) by the ovate-lanceolate 10 mm long inner tepals (*vs* linear-lanceolate, 8 mm long inner tepals) and the cup-shaped perianth (*vs*. horizontally spreading).

Erect perennial herbs 12–39 cm high. Bulbs 0.8–1.2 × 1.5–2.2 cm, rounded, ovoid; cataphylls papyraceous, brown, neck 1.8–3.6 × 0.3–0.5 cm. Flowering stem cylindrical, 2.8–14.8 cm long, erect, sulcate, pale yellow. Leaves basal and cauline, linear, acuminate, parallel veined and longitudinally plicate, 18–32 cm long; cauline leaves 1–2; 23–36 × 0.5–0.7 cm, the first leaf 11–25 × 0.3–0.5 cm, the second leaf 5–12 × 0.2–0.3 cm. Inflorescence rhipidium 1–3 flowers erect. Spathes 3–3.8 × 0.3–0.7 cm, lilac, lanceolate, united for 0.5–0.7 cm in the base, margin translucent, apex acute. Pedicels 3.0–3.6 cm long, filiform, erect. Perianth 2.3–2.7 cm diameter, the outer and inner tepals forming a cup at the base. Outer tepals 12–17 × 5–8 mm, oblong- pandurate, ivory-white, apex rounded, abaxially ivory-white with lilac lines and adaxially ivory-white. Inner tepals 8–10 × 4–5 mm, ovate-lanceolate, ivory-white, apex acute, with elaiphore present in at base. Filaments united for 4–5 mm, erect and columnar. Anthers 3.5 mm long, narrowly oblong, flattened and falcate, each between a pair of the style branches. Style 8.5 mm long, erect, filiform, the branches 3.5–4 mm long, bifid above a fused base 1 mm in length, filiform, the stigmatic part at the apex. Ovary 6–7 × 1.2–1.5 mm, elliptic to ovoid, sulcate. Fruit a capsule 8–10 × 4–5 mm, elliptic, dehiscent apically, apex truncate. Seeds 4–5 per locule, variable size, globose, rugose, dark orange. Figure 1.

Discussion. – *Mastigostyla moqueguensis* has a filiform style similar to *M. boliviensis* (R.C.Foster) Goldblatt, *M. coronata* Pozner, *M. shepardiae* (R.C.Foster) Ravenna, *M. torotoroensis* Huaylla & Wilkin, *M. tunariensis* (R.C.Foster) Ravenna and *M. venturii* (R.C.Foster) Ravenna (Table 1). *M. moqueguensis* distinguished from these species by tepals which form a cup-shaped structure at the base. According to field observations and herbaria specimens these species tgrow in dry inter-Andean valleys and the Puna of Bolivia and Argentina, distributed at 2700-4500 m of elevation. *M. moqueguensis* differs from *Tigridia philippiana* I.M. Johnst by ovate-lanceolate internal tepals, apex acute (vs. oblong, apex rounded).

Phenology. – Plants were collected in flower and fruit in March.

Conservation status. – According to IUCN criteria (2019) a preliminary status of critically endangered (CR B2a; D) is assigned. *Mastigostyla moqueguensis* deserves protection because these criteria are defined as: B2, area of occupancy < 10 km^2; B2a, one population known; D, population is estimated to be less than 50 mature individuals. The habitat of *M. moqueguensis* is at risk due to overgrazing and erosion.

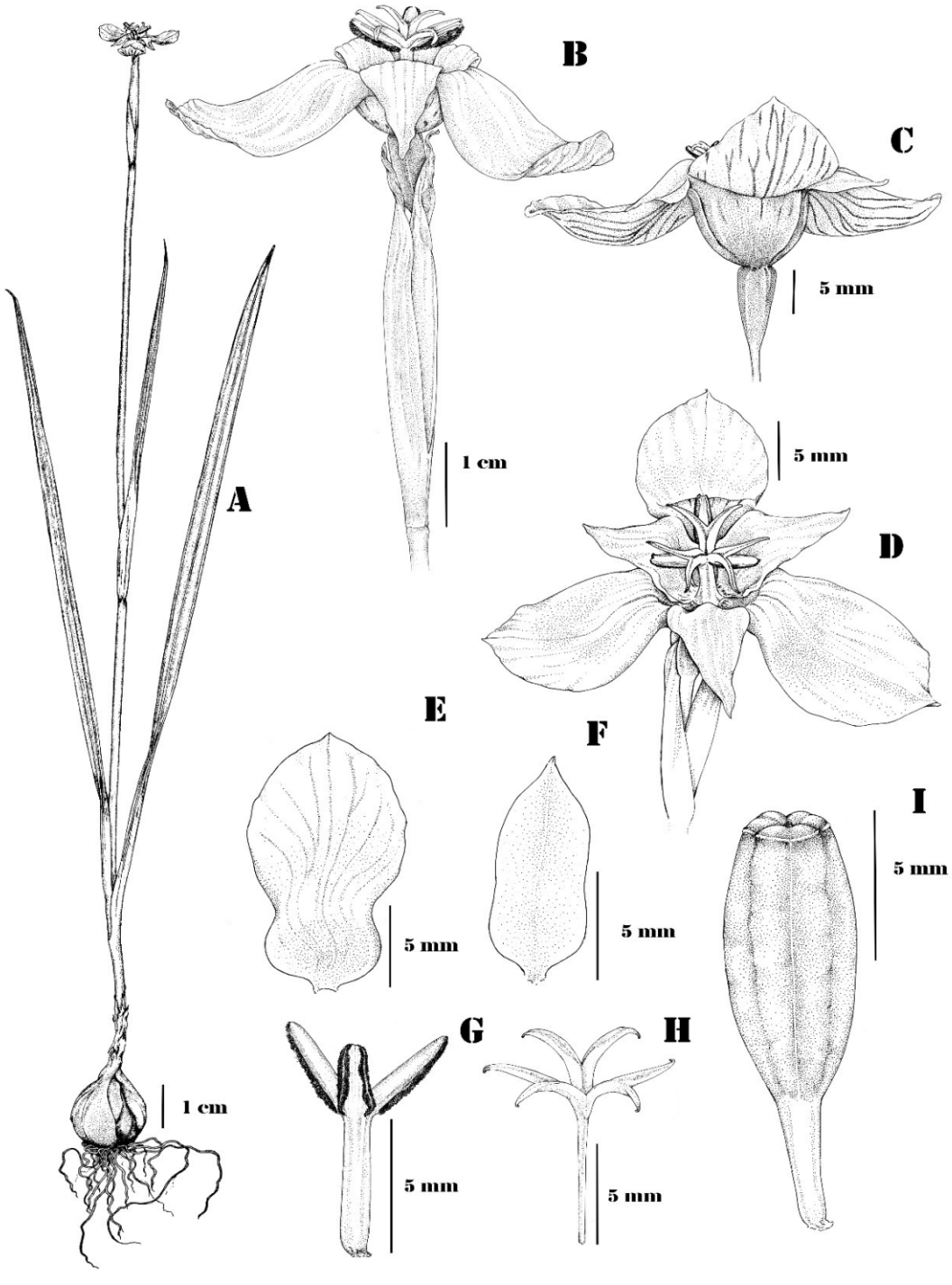

Figure 1. *Mastigostyla moqueguensis*. **A.** Habit **B.** Flower side view **C.** Flower side view a cup-shaped in at the base **D.** Flower frontal view **E.** Outer tepals **F.** Inner tepal **G.** Filaments and anthers **H.** Style and style branches **I.** Fruit (Illustration by N. Sánchez).

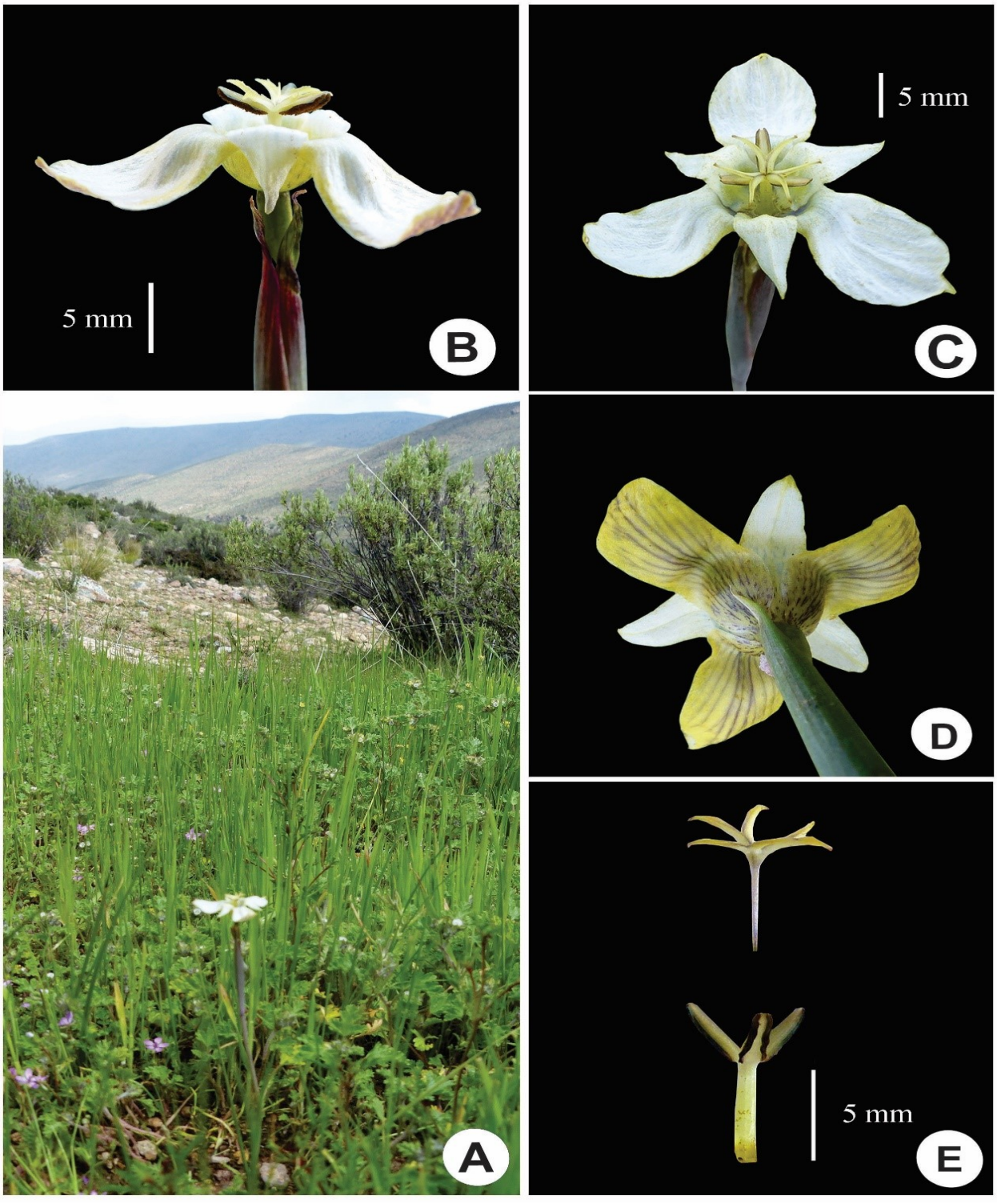

Figure 2. *Mastigostyla moqueguensis*. **A.** Growth habit **B.** Flower, lateral view **C.** Flowers, front tilt view **D.** Flowers, bottom view **E.** Androecium and gynoecium. Photographs by *Huaylla & Llalla*.

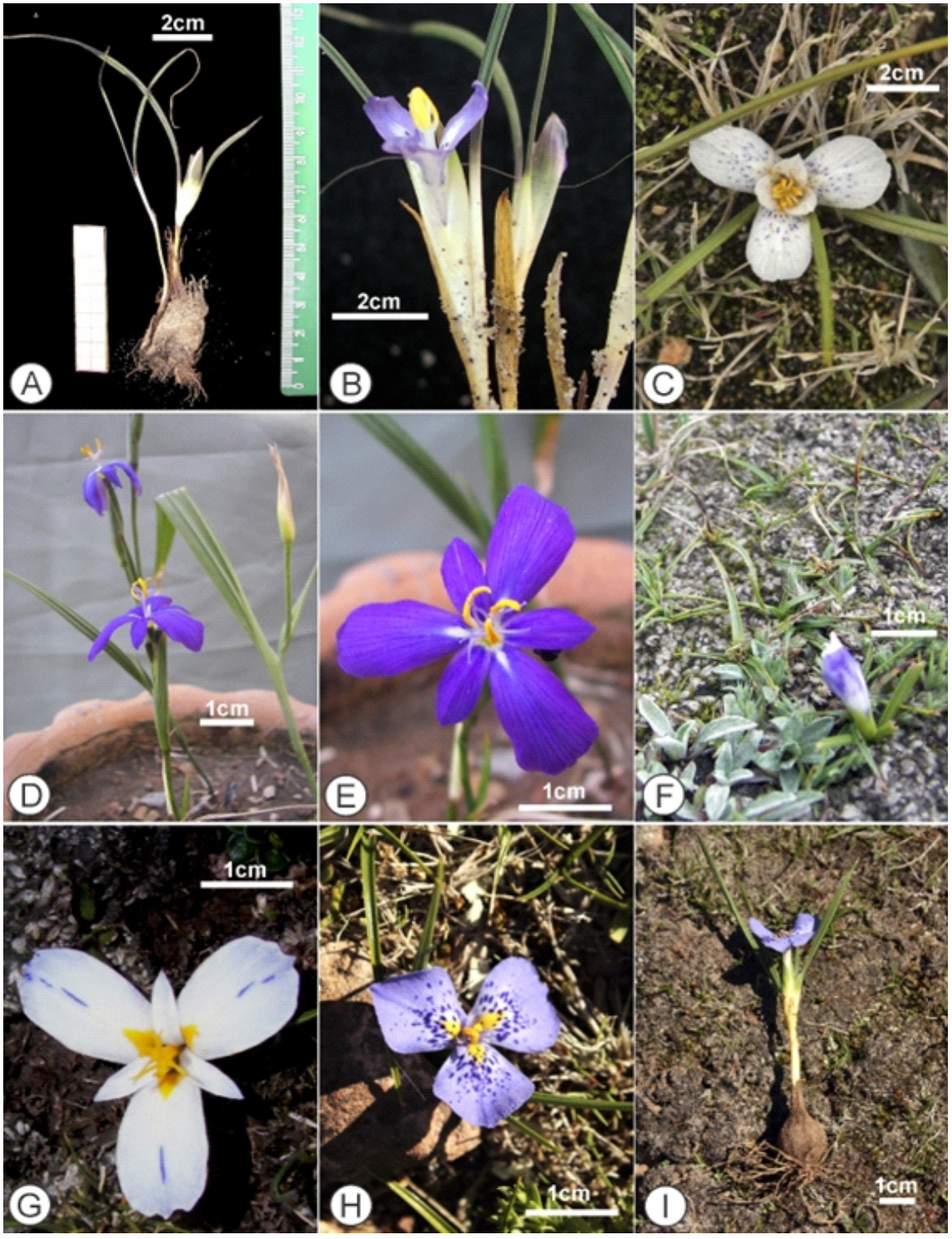

Figure 3. *Mastigostyla* I. M. Johnston in the Andean region. **A-B.** *M. boliviensis*. **C.** *M. coronata*. **D-E.** *M. torotoroensis*. **F-G.** *M. tunariensis*. **H-I.** *M. venturii*. Photographs **A, B, D, E, F, G** H. Huaylla; **C** Instituto de Botánica Darwinion (through http://www.darwin.edu.ar/ImagenesIris/Mastigostyla%20coronata-CZ-210.JPG); **H, I.** E. Bulaceo

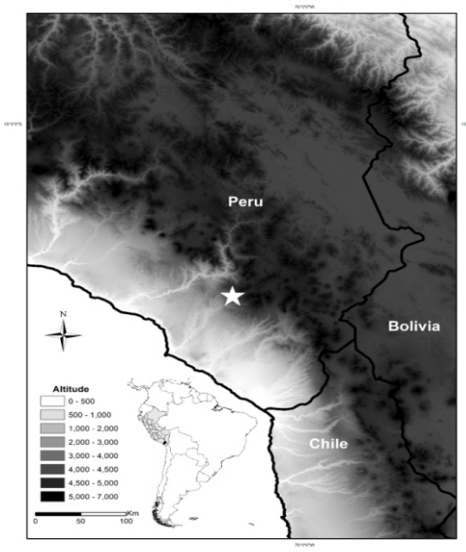

Figure 3. Geographical distribution of *Mastigostyla moqueguensis* in Peru (star).

Table 1. Morphological characters of *Mastigostyla* species with filiform style branches.

Character/Species	M. boliviensis	M. coronata	M. moqueguensis	M. shepardae	M. torotoroensis	M. tunariensis	M. venturii
Plant height (cm)	17–23	3–8	25–32	8.2–12	17–60	5.5–9.5	11–15.2
Leaf basal (cm)	15–23	5.5	18–32	3.7–6.4	0	4.8–5.4	13.2 - 0.2
Leaf cauline (cm)	11.5–20	4	23–36	3.8	14–44	6–8	6–7 cm
Flower number	1	1	1–3	1–2	1–2	1	1–2
Flowering stem (cm)	4–6.5	–	2.8–14.8	1.8–3	24–30	0.7–2	4–2.8
Flower color	Blue to light blue, white basally	White with violet spots	Ivory-white	Blue	Dark blue with a white blotch at base	Blue to white or with irregular dark blue marks adaxially	Blue to pale blue with irregular dark blue marks adaxially
Spathe (cm)	3.4–1.5 - 0.4–0.5	1.8–2 - 0.1–0.12	3–3.8 - 0.3–0.7	2–2.7 - 0.3–0.5	1.9–2.8 - 0.3–0.5	1.4–1.6 - 0.3–0.4	2.5 - 1
Pedicels (cm)	0.3–0.6	–	3.0–3.6	1.3–1.8	2.2–3.5	0.5–0.7	2–2.2
Perianth united height (cm)	0.4–0.7	0.2–0.25	Free	0.3–0.4	Free	0.1	2
Tepal outer size (mm)	14 - 0.6	13–15 - 7–9	12–17 - 5–8	15 - 5	13–16 - 3–6	12 - 4.6	15 - 3
Tepal inner size (mm)	6 - 3.5	9–8 - 4	8–10 - 4–5 mm	5 - 1.5	8–11 - 2–3	3 - 1	8 - 1
Tepal inner shape	Linear	Obovate-spathulate	Ovate-lanceolate	Linear-lanceolate	Oblong-lanceolate	Oblanceolate linear	Linear-lanceolate
Inner tepal glandular base	Present	Present	Present	Present	Absent	Absent	Present
Filament united length (mm)	5–8	3–4	4–5	7–11	4–7	5	7
Anther length (mm)	3–4	2.5–3	3.5	4	3–5	4	2.5
Style length (mm)	5–9	5–6	85	11	10	6	5
Style branches length (mm)	1	2–2.5	35–4	3	3–6	15	5
Geographical distribution	Bolivia (Potosí, Cayara)	Argentina (Jujuy, Manuel Belgrano)	Peru (Moquegua, Mariscal Nieto)	Peru (Puno, Huancané)	Bolivia (Potosí, Charcas)	Bolivia (Cochabamba, Quillacollo)	Argentina (Jujuy, Valle Grande)

Habitat and Distribution. – Endemic to Moquegua (southern Peru) where it grows in the high Andes Puna at 3700 m in an open stony area with sandy soil and rock outcrops (Fig. 3). Associated species include *Lupinus* sp., *Polylepis rugulosa* Phil., *Azorella compacta* Phil., *Cumulopuntia boliviana* subsp. *ignescens* (Vaupel) Hunt, *Lobivia pampana* Britton & Rose, *Adesmia spinosissima* Mayen, *Baccharis sp.*

Etymology. – The epithet refers to the region of Moquegua, to which this species is restricted.

Acknowledgements

We wish to thank the herbaria BOLV, CUZ, HSB, K, LPB, MCNS, MO, NY, USM, US, USZ for access to their collections. We would like to thank John Wood for translating and revising the manuscript, Arnold Manchego and Valentin Garces for collaboration in the field work and the Instituto de Botánica Darwinion for permission to use the photograph of M. coronata. The authors also acknowledge SERFOR for the collection permit N° AUT-IFL-2019-069.

References

Byng, J. W., M. W. Chase, M. J. M. Christenhusz, M. F. Fay, W. S. Judd., A. N. Sennikov, D. E. Soltis, P. S. Soltis & P. F. Stevens. (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society 181*: 1-20

Chauveau, O., Eggers, L., Souza-Chies, T. T., & Nadot, S. (2012). Oil-producing flowers within the Iridoideae (Iridaceae): evolutionary trends in the flowers of the New World genera. *Annals of botany*, *110*(3), 713-729. https://doi.org/10.1093/aob/mcs134

Celis Pacheco, Y. M. (2012). *Relaciones filogenéticas en la tribu tigridieae (iridaceae) / Phylogenetic relationships in tigridieae (iridaceae)*. [PhD Thesis, Universidad Nacional de Colombia]. https://repositorio.unal.edu.co/handle/unal/11508

Donadío, S., Nicola VM., Scataglini MA., & Pozner R (2016). A new Species of *Mastigostyla* (Iridaceae) From Argentina. *Systematic Botany 43*: 714-719. https://doi.org/10.1600/036364416X692280

ESRI. (2015). ArcGIS Desktop: Release10.3. Redlands *CA*.

Goldblatt, PA., & Manning, JC. (2008). *The Iris family: Natural history & classification*. Portland-London: Timber Press.

Huaylla, H. (2015). *Sistemática de Mastigostyla* e *Cardenanthus (Iridaceae)*. [PhD Thesis, Universidad Estadual de Feira de Santana. Brasil]

IUCN. (Standards and Petitions Committee). (2019). Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee.

León, B. (2006). Iridaceae endémicas del Peru. In: El libro rojo de las plantas endémicas del Perú. *Revista Peruana de Biología 13*: 752-754.

Ravenna, P. (1964). Notas sobre Iridaceae. *Revista Instituto Municipal de Botánica 2*

Thiers, B. (2020). Index Herbarium: A Global Directory of Public Herbaria and Associated Staff. New York Botanical Garden's Virtual Herbarium http://sweetgum.nybg.org/science/ih/