Blumea 61, 2016: 4–7
www.ingentaconnect.com/content/nhn/blumea

RESEARCH ARTICLE

http://dx.doi.org/10.3767/000651916X690962

Tigridia arequipensis (*Iridaceae*: *Tigridieae*), a new species from South Peru

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Keys words

Arequipa
Iridaceae
new species
South Peru
Tigridia

Abstract *Tigridia arequipensis* (*Iridaceae*: *Tigridieae*) is a new species found in the province of Arequipa (department of Arequipa), South Peru. It is unique by its white to pale white (or pale lilac) flowers, outer tepals with purplish maroon and dark yellow spots and stripes, and inner tepals with pale purplish and bluish spots and stripes. *Tigridia arequipensis* is morphologically similar to *T. raimondii* and *T. philippiana*, it differs by having longer basal leaves, narrower and larger bracts, and outer tepals ovate and longer fruits.

Resumen *Tigridia arequipensis* (*Iridaceae*: *Tigridieae*) es una nueva especie encontrada en la provincia de Arequipa (departamento de Arequipa), Sur de Perú. Es única por sus flores blancas a blanco claras (o lila pálido), los tépalos externos con puntuaciones y líneas lila-marrones y los tépalos internos con puntuaciones y líneas lila pálido con puntuaciones y líneas azuladas. *Tigridia arequipensis* es morfológicamente similar a *T. raimondii* y *T. philippiana*, se difiere por tener hojas basales más alargadas, brácteas angostas y alargadas, los tépalos externos ovados y frutos más alargados.

Published on 8 February 2016

INTRODUCTION

Tigridia Juss. (*Iridaceae*: *Tigridieae*) is a New World genus of about 50 species (Rodriguez & Ortiz-Catedral 2003). In Peru there are 11 known species (Macbride 1936, Brako & Zarucchi 1993, Goldblatt 1998, Tropicos 2014). Six species are endemic to this country and the knowledge of their distribution is still incomplete (León 2006). The discontinuous geographic distribution in North and South America offers an ideal model to explore biogeographical aspects (Rodríguez & Ortiz-Catedral 2003). The variation in colour, size and form of the perianth in *Tigridia* indicate that the adaptation of the pollinators has been an important factor for its diversification (Rodríguez & Ortiz-Catedral 2003). Presumably the species of *Tigridia* are hummingbird-pollinated (Rudall et al. 2003); they secrete copious amounts of sugary nectar from nectaries on the inner tepal claws (Cruden 1971).

Celis (2012) studied the phylogenetic relations of the tribe *Tigridieae* suggesting new combinations in *Tigridia* and *Mastigostyla* based on plastid (cpDNA) and nuclear (nDNA) genomes.

During February and March of 2011 and 2012, we collected a tall *Tigridia* on the xeric scrublands of the province of Arequipa (department of Arequipa), South Peru. After a detailed morphological analysis, we conclude that this is an undescribed species.

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TAXONOMY

Tigridia arequipensis Montesinos, Pauca & I.Revilla, *sp. nov.* — Fig. 1

Subgenus. *Tigridia.*

Etymology. Tigridia arequipensis is named after the province of Arequipa, where the species was found.

Type. *Revilla 156* (holotype HSP; isotype HUSA, USM), Peru, Arequipa Region, Arequipa Province, District of Quequeña, road to Sogay, terrestrial on clayey-sandy rocky soils on rocky slopes, elev. 2676 m, S16°33'31.77" W71°26'20.40", 29 March 2011.

Erect bulbous perennial herb 60–90 cm high, glabrous, bulb ovoid to narrowly ovoid, 2.5–3 by 1.2–2.5 cm, the outer tunics thin, pale to dark brown, densely clothed. *Leaves*: basal leaf linear, conduplicate, 29–62 by 3–8 mm, equal to or longer than the flowering stems, cauline leaves 1–3, rarely 4, linear, plicate, the lower 28–62 by 3–9 mm and the upper 12–30 by 1.5–7 mm; flowering stem to 82 cm high. *Inflorescence* a rhipidium with the bracts subequal, 3–6.5 by 4.5–6 mm, conduplicate, acute; pedicels 4–5.5 cm long, sulcate; inflorescence with 5–9 flowers in each rhipidium, erect; flowers 5–7 cm diam and 1–1.5 cm long. *Tepals* connivent at base forming a shallow cup, margin entire, spreading distally, basally brilliant brown, outer ones ovate, entire, acuminate, 1.9–2.3 by 7–9 mm, white to pale white (or pale lilac) with purplish maroon and dark yellow spots and stripes; inner tepals, ovate to deltoid, uniguiculate at the base, 1.9–2.2 by 8–9 mm, white to pale white or pale lilac blue with pale purplish and bluish spots and stripes, glands situated at the mid base of the inner tepals, semi-circular, brilliant. *Filaments* connate for c. 1.2 cm, anthers oblong, ascendent, 4–5.5 by 1–1.5 mm. *Style* branches 3–4 mm long, deeply bifid into 2 style arms, pale yellow to pale purple. *Capsules* ellipsoid, 1–2.2 by 3–5 mm, grooved and dark to pale brown. *Seeds* dark brown, shiny, 2 by 1 mm.

Ecology & Distribution — *Tigridia arequipensis* is distributed on clayey-sandy soils on rocky slopes, in the Arequipa Region

Fig. 1 *Tigridia arequipensis* Montesinos, Pauca & I.Revilla. a. Young plant in occasional humid soils near the waterfalls of Sogay, Quequeña district at 2914 m; b. mature plant in a xeric scrubland habitat, Cerro Llorón, Socabaya district at 2490 m; c. xeric scrubland habitat in Quequeña district at 2700 m; d. flower opening at Misti volcano lower slopes, Alto Selva Alegre District, 2800 m; e. flower and fruits at Sogay, Quequeña district at 2914 m; f. mature flower in Cerro Llorón, Socabaya district at 2490 m. — Photos: a, b, f, e. by D.B. Montesinos-Tubée; c, d. by I. Revilla.

Table 1 Comparative data of some characters of *Tigridia arequipensis* and its closest relatives.

Species	Height (cm)	Number of cauline leaves	Leaf size (basal and cauline)	Style size (mm)	Flower colour	Tepal apex	Outer tepal	Inner tepal	Capsule shape (mm)	Distribution
T. raimondii	30–40	1	15–30 cm long, 14–18 mm wide		white with basal sect. purple	lobed	white	white-purplish	–	Atiquipa (Arequipa)
T. philippiana	25–45	1	15–40 mm long, 3–8 mm wide	2–2.5	white, pale yellow to pale purple	lobed	white-yellowish	white-yellowish	oblong, 2.8 by 7	N Chile, Ancash (Peru)
T. albicans	40	2	20 cm long, 5 mm wide	0.6	white	entire	white	white	circular, 8 by 5	Tacna
T. arequipensis	60–90	1–3	12–70 cm long, 1.5–9 mm wide	3–4	white to pale white (or pale lilac)	entire, acuminate	white to pale white (or pale lilac) with purplish maroon and dark yellow spots and stripes	white to pale white or pale lilac blue with pale purplish and bluish spots and stripes	ellipsoid 10–22 by 3–5	Arequipa province

in South Peru. It grows terrestrial on superficial soils on rocky slopes and occasional humid environs in xerophytic-scrubland communities at an elevation of 2490–3135 m and in association with *Ambrosia artemisioides* Willd., *Weberbauerocereus weberbaueri* (K.Schum. ex Vaupel) Backeb., *Solanum paposanum* Phil., *Anthericum eccremorrhizum* Ruiz & Pav. and *Mentzelia scabra* subsp. *chilensis* (Gay) Weigend. Flowering and fruiting takes place between February and March, rarely in April. Fig. 2 shows the distributions of the Peruvian species *Tigridia albicans* Ravenna, *T. grandiflora* Salisb., *T. huyanae* (J.F.Macbr.) Ravenna, *T. lobata* (Herb.) J.F.Macbr., *T. minuta* Ravenna, *T. pavonia* (L.f.) DC., *T. pearcei* (Baker) Ravenna, *T. philippiana* I.M. Johnst., *T. purruchucana* (Herb.) Ravenna, *T. raimondii* Ravenna and *T. violacea* Schiede ex Schltdl. (Ravenna 1964, 1969, 1988, Brako & Zarucchi 1993, Goldblatt 1998, León 2006, Tropicos 2014).

Conservation status — Following the criteria and categories of IUCN (2012), a preliminary status of Vulnerable (VU) is assigned (A1a+D1). The new species deserves protection because its total area of occupancy is less than 200 km^2; population size is estimated to be fewer than 200 individuals (D1); and we observed a reduction of the population mainly caused by human urbanization and habitat destruction (A1a). The suitable habitats for *T. arequipensis* on the xeric scrubland slopes in the Socabaya, Polobaya, Mollebaya and Quequeña districts are regarded as vulnerable because changes in annual rainfall, volcanic activity, exploitation of natural resources and uncontrolled urbanization, may all potentially reduce their extent.

Additional material examined (paratypes). Peru, Arequipa Region, Arequipa Province, *Montesinos 3404* (CUZ, USM), District of Socabaya, Cerro Llorón, terrestrial on clayey-sandy rocky soils on rocky slopes, elev. 2490 m, S16°29'13" W71°32'31", 8 Mar. 2012; *Montesinos 3495* (HSP, HUSA), District of Mollebaya, Molinoyoc, terrestrial on clayey-sandy rocky soils on rocky slopes, elev. 2820 m, S16°30'10" W71°26'44", 10 Mar. 2012; *Revilla 170* (HSP, USM), District of Quequeña, near Sogay, terrestrial on clayey-sandy rocky soils on rocky slopes, elev. 2749 m, S16°34'8.87" W71°24'33.47", 3 Apr. 2011; *Revilla 188* (HSP, USM), District of Alto Selva Alegre, Parque ecológico, plain terrain with *Cactaceae* and shrub plants, terrestrial on clayey-sandy soils, elev. 3135 m, S16°19'31.89" W71°29'1.39", 10 Apr. 2011.

Note — The new species is morphological similar to *Tigridia raimondii* Ravenna and *T. philippiana* I.M.Johnst. but is clearly distinguished by the white to pale white (or pale lilac) outer tepals with purplish maroon and dark yellow spots and stripes, and inner tepals with pale purplish and bluish spots and stripes. Moreover. it differs by having longer basal leaves and fruits, narrower and larger bracts and longer style branches.

DISCUSSION

This species is known only from the xeric scrublands in the vicinity of the Arequipa city at elevations from 2490 to 3135 m. The flowering stem begins to grow with the onset of the rainy season, and anthesis occurs shortly thereafter.

Within *Tigridia arequipensis* two distinct morphological forms are recognizable.

In the vicinity of Quequeña and Alto Selva Alegre the colour of the corolla is pale lilac to pale white with a reticulum of purple spots and stripes on both blade and limb of the outer tepals. Near Yarabamba and Socabaya, the corolla have the colour of white to pale white, outer tepal purplish maroon with dark yellow spots and stripes.

Tigridia arequipensis is most similar to *T. raimondii* and *T. philippiana* in subg. *Tigridia* (Molseed 1970), but is a plant from high elevations, while *T. raimondii* and *T. philippiana* grow at lower elevations and in drier habitats. The white-flowered *T. raimondii* is a plant of subhumid lomas in Atiquipa, Arequipa at

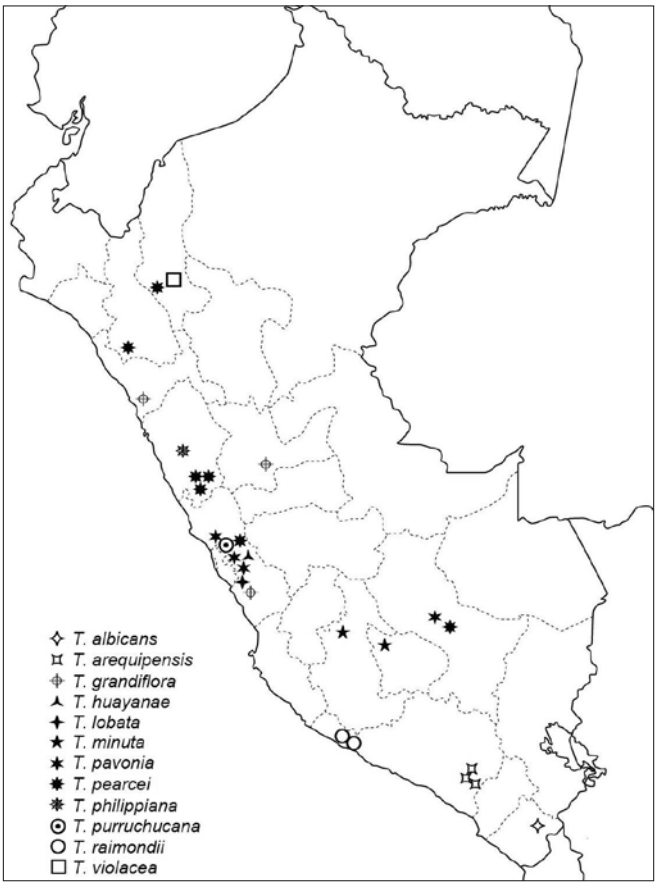

Fig. 2 Map showing the distribution of *Tigridia arequipensis* and the other species occurring in Peru.

elevations of 500–1500 m, *T. philippiana* occurs in coastal areas of Antofagasta, Chile (Johnson 1929, Marticorena et al. 1998, Rodríguez & Marticorena 2000, Rosas 2010, Rosas et al. 2010) and Ancash, Peru (Tropicos 2014).

The new species is further differentiated from *T. albicans* by the larger plant size, flower colour (yellow in *T. albicans*) and by the longer style.

We compare the main characters of the new species and *Tigridia raimondii, T. philippiana* and *T. albicans* in Table 1.

Acknowledgements Fieldwork by the first author was funded by Michell & Cía (Arequipa, Peru) and Alberta Mennega Stichting (Utrecht, The Netherlands). Fieldwork by the third author as part of the project 'Diversidad de Asparagales (*Amaryllidaceae* J.St.-Hil., *Asparagaceae* Juss., *Iridaceae* Juss. and *Xanthorrhoeaceae* Dumort.) en la provincia de Arequipa'. The Dirección General Forestal y de Fauna Silvestre (DGFFS) for permits to collect outside protected areas; we acknowledge D. Heredia, B. Flores, D. Caballero, C. Tejada, J.A. Quiroz, J.C. Quiroz, T. Pinto and J. Quispe for fieldwork support. W. Galiano for discussion in the taxonomic section. R. Kiesling, H. Trinidad, J. Watson and Library Wageningen UR helped with the literature. Curators of the herbaria USM and MO are thanked for the availability of their establishments and plant collections.

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