



## *Baccharis rectialata* (Compositae: Astereae): a new species of carqueja from Uruguay

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### Abstract

*Baccharis rectialata* (Compositae: Astereae), a new species of *B.* sect. *Caulopterae* from the grasslands in northeastern Uruguay is described. The new species is morphologically similar to *B. crispata* and can be differentiated by its straight wing margins, shorter involucres and pappus in staminate capitula. We provide a detailed morphological description, and information on the distribution, habitat, phenology, and conservation status. Additionally, we discuss the main differences between *B. rectialata* and other closely related and morphologically similar species, and provide a key for identification of subshrubs belonging to *B.* sect. *Caulopterae* occurring in Uruguay, as well as illustrations, images, and a distribution map of the new species.

### Resumen

Se describe *Baccharis rectialata* (Compositae: Astereae), una nueva especie perteneciente a *B.* sect. *Caulopterae*, característica de los pastizales del noreste del Uruguay. La nueva especie es morfológicamente similar a *B. crispata*, de la que se diferencia en sus alas no sinuosas y sus involucros y papus más cortos en los capítulos estaminados. Este trabajo incluye la descripción morfológica detallada de la nueva especie, la distribución geográfica, datos del hábitat en que se desarrolla, la fenología y el estatus de conservación. Adicionalmente se examinan los principales caracteres que permiten diferenciar a *B. rectialata* de las especies morfológicamente más similares y se presenta una clave para la identificación de las especies de subarbustos que pertenecen a *B.* sect. *Caulopterae* presentes en Uruguay, junto con ilustraciones, imágenes, y el mapa de distribución de la nueva especie.

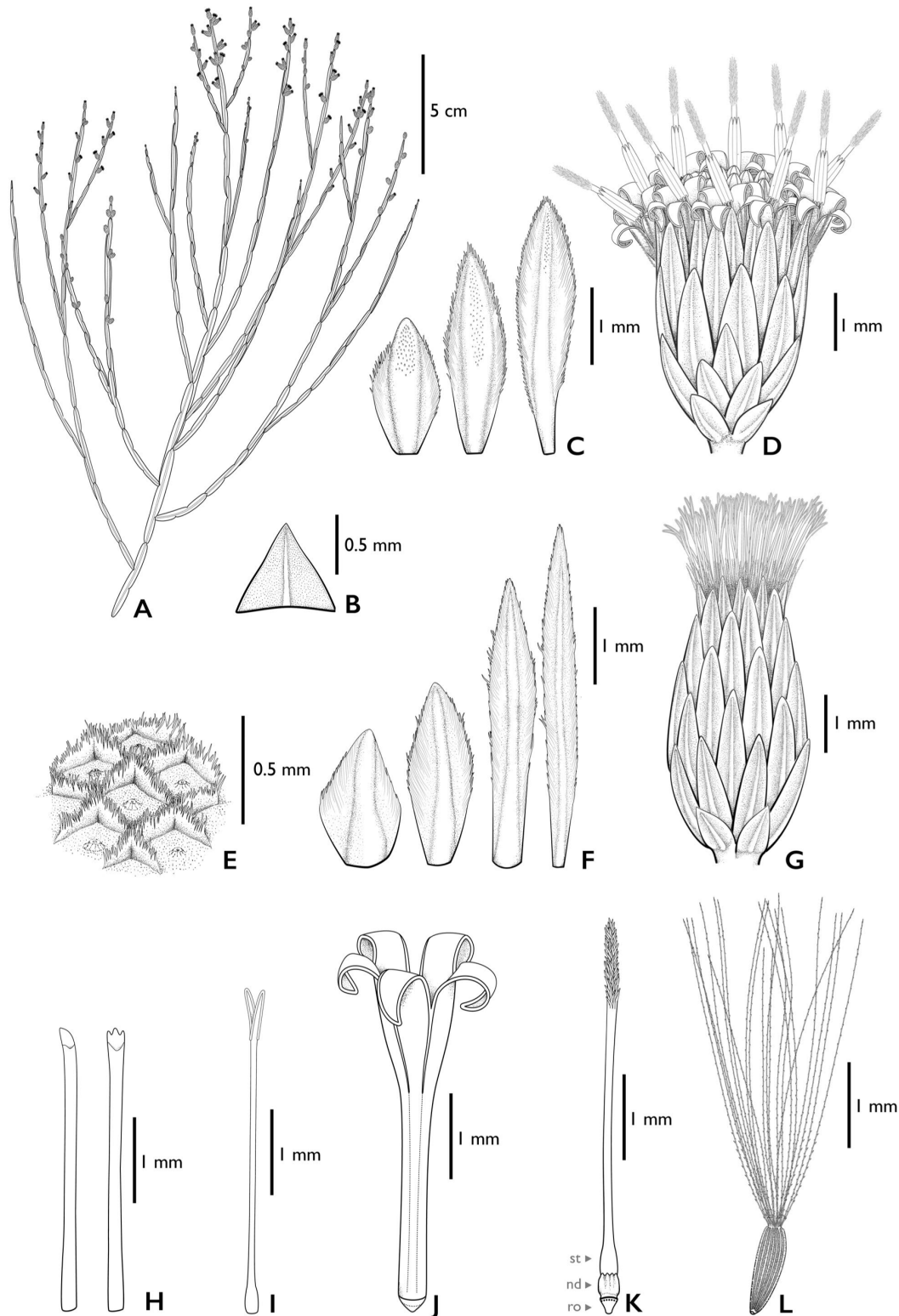
**Keywords:** Asteraceae, Baccharidinae, *Baccharis* sect. *Caulopterae*, pampas

### Introduction

*Baccharis* Linnaeus (1753: 860), with more than 440 species, ranks among the largest genera in the Compositae and is the largest in the Astereae (Fielding 2001, Giuliano 2001, Müller 2006, Giuliano & Freire 2011, Heiden *et al.* 2019). This genus is characterized by the presence of tufted trichomes on stems and leaves (Volkens 1890, Ariza Espinar 1973) and by its gynodioecious (generally functionally dioecious) nature.

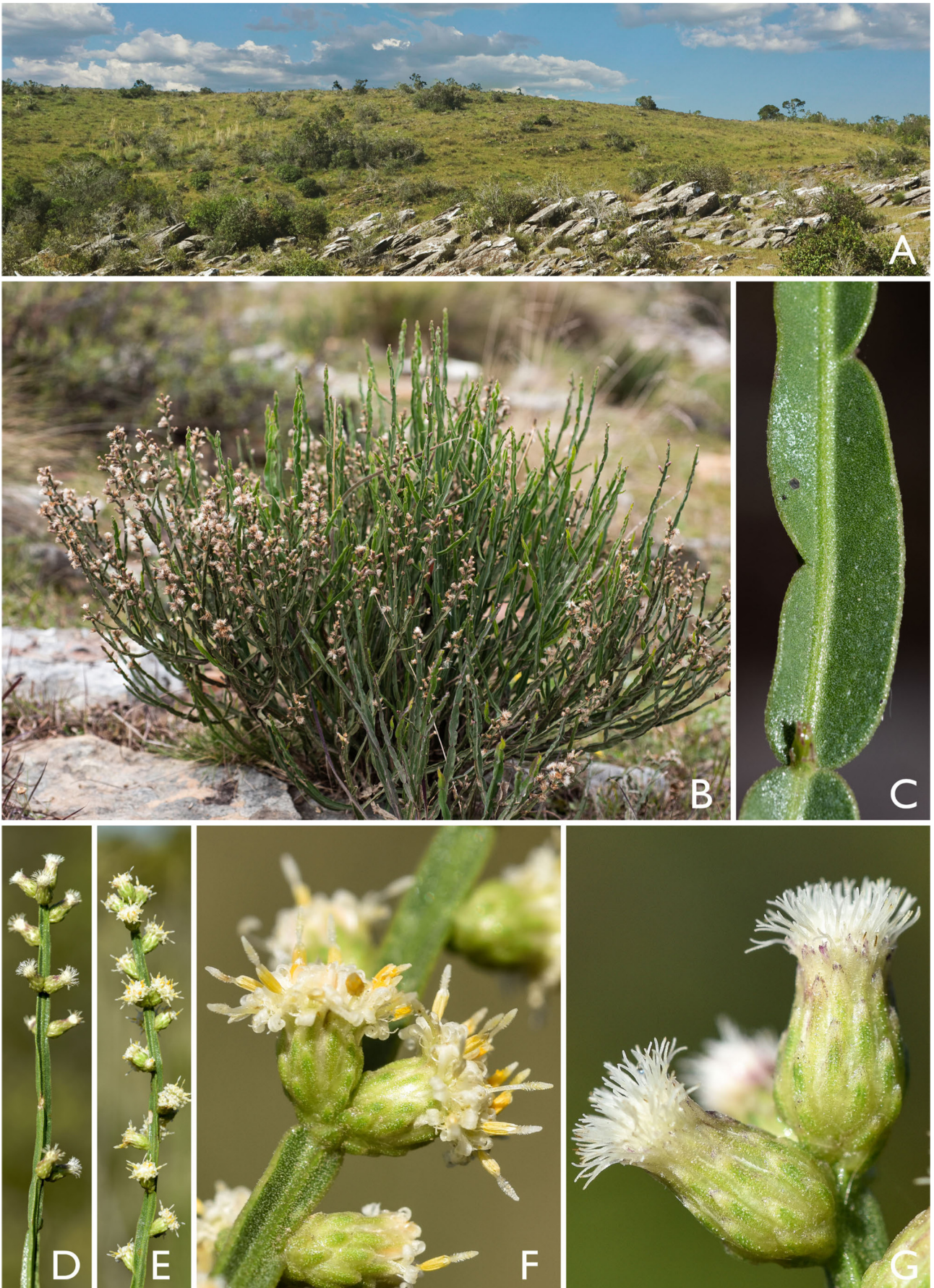
*Baccharis* sect. *Caulopterae* Candolle (1836: 424) in its past circumscription (*B.* sect. *Caulopterae* *s.l.*; sensu Giuliano 2001, Müller 2006, Heiden *et al.* 2009) included ca. 35 species (Heiden *et al.* 2009) and was readily characterized by the winged nature of their stems, although six species included in the previous circumscriptions of the section did not bear this character. *Baccharis* sect. *Caulopterae* *s.l.* has been found to be paraphyletic on the basis of molecular phylogenetic evidence and emerged as two clades (Heiden *et al.* 2019). These latter authors presented a new infrageneric classification of the genus in which the circumscription of *B.* sect. *Caulopterae* *s.s.*, with about 15 species, and *B.* sect. *Aphyllae* Baker (1882: 5), with 35 species, were reassessed. In its current circumscription, the

section remains restricted to South America and it occurs from the Colombian Andes to central Argentina, extending to east Uruguay and Eastern Brazil from Rio Grande do Sul in the south to Ceará in the northeast. The two sections can be morphologically distinguished by the 12–20-ribbed cypselae (*B. sect. Caulopterae*) versus 5–10-ribbed cypselae (*B. sect. Aphyllae*).



**FIGURE 1.** *Baccharis rectilata*. A. Habit. B. Leaf. C. Phyllaries from staminate capitulum (left to right, outer to inner phyllaries). D. Staminate capitulum. E. Detail of fimbriate receptacle. F. Phyllaries from pistillate capitulum (left to right, outer to inner phyllaries). G. Pistillate capitulum. H. Pistillate floret corolla. I. Pistillate floret style. J. Staminate floret corolla. K. Staminate floret style. L. Cypselae and pappus of a pistillate floret. (*V. Valtierra et al. 320, 321, MVFA and C. Brussa & M. Alvarez 29922, MVJB*). Drawn by Valtierra & Bonifacino.





**FIGURE 2.** *Baccharis rectialata*. A. Habitat in grasslands in Quebrada de los Cuervos, Treinta y Tres, Uruguay. B. Habit. C. Close-up of wings; notice wing's straight and narrow nature and rough texture. D. Capitulescence of pistillate individual. E. Capitulescence of staminate individual. F. Close-up of staminate capitulum. G. Close-up of pistillate capitulum.



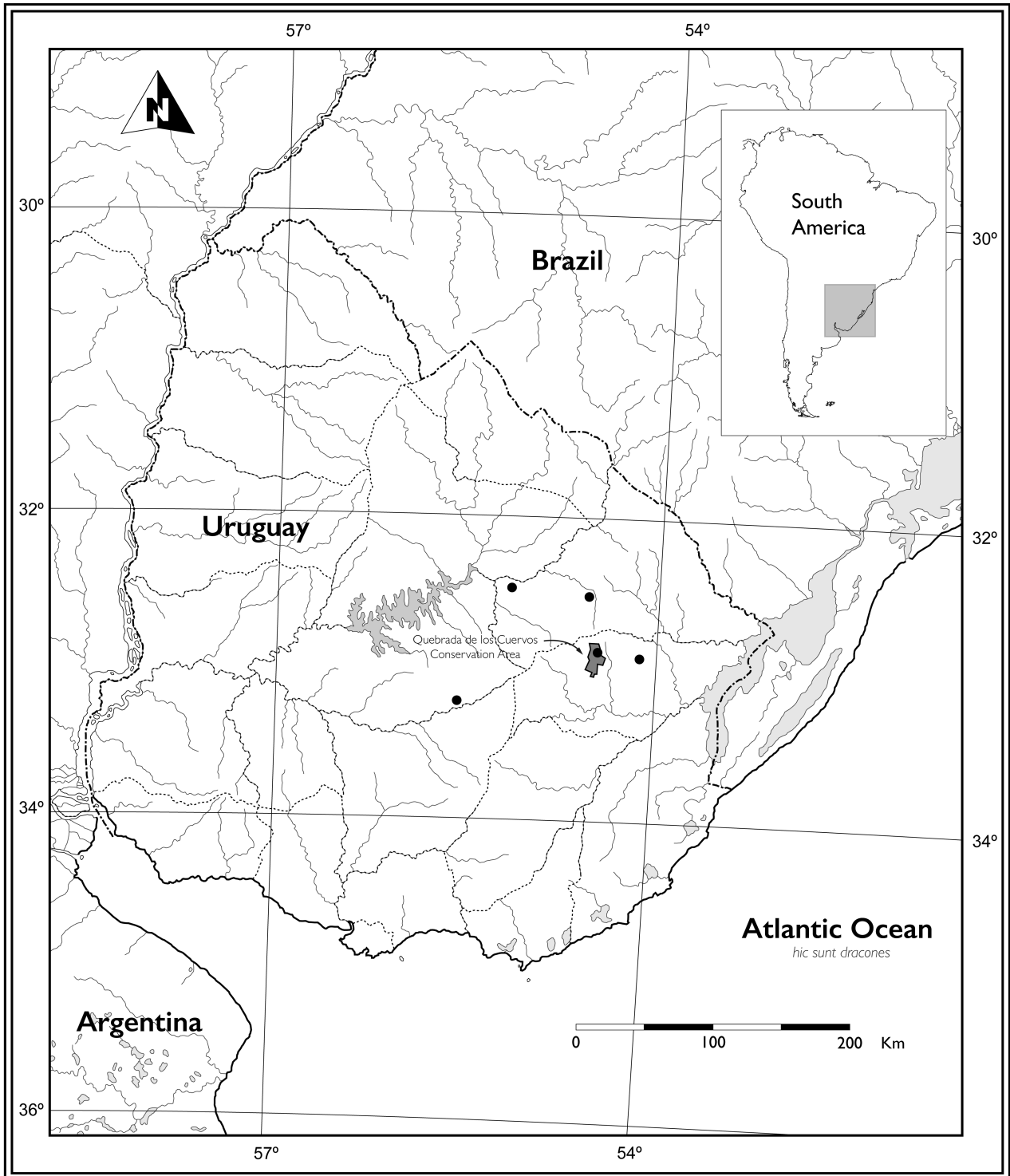


FIGURE 3. Geographic distribution of *Baccharis rectialata* (Asteraceae).

In Uruguay, *Baccharis* is composed of ca. 50 species. It is the largest genus of vascular plants in the country (Bonifacino *et al.* 2019), constituting about 10% of the total species in the genus, and is represented in the area by five of the seven subgenera currently recognized (Heiden *et al.* 2019). During the taxonomic revision of *B.* sect. *Caulopterae* in Uruguay, we came across some specimens that, after close examination, proved to belong to a new hitherto undescribed species belonging to *B.* subgen. *Baccharis* sect. *Caulopterae* s.s.

In this work, we describe and illustrate the new species, which we propose to name *Baccharis rectialata* Valt., Bonif., G.Heiden & Marchesi based on its most striking morphological feature, and we provide images from live individuals, information on its geographical distribution, habitat, etymology, phenology, and conservation status.

Additionally, we discuss the main differences between *B. rectialata* and other closely related and morphologically similar species, and we provide a key to the subshrubs species of *B. sect. Caulopterae* s.s. occurring in Uruguay.

## Material and methods

As part of our taxonomic revision of *Baccharis* sect. *Caulopterae* from Uruguay, we identified a new species based on data from herbarium, field-collected specimens, and the observation of live plants in the field.

We studied herbarium material hosted at MVFA, MVJB, and ECT (acronyms according to Thiers, continuously updated), and analyzed type material and protologues of closely related and morphologically similar species (Lamarck 1786, Sprengel 1826, Lessing 1831).

Wing width measurements were carried out on the main stem at two points: at a point located in the mid portion of the capitulescence length (apical width), and at the base of a segment of equal length to that of the capitulescence and located immediately below it (basal width). Since each leaf is associated with two wings and both wings are always of different length, we only considered the longer one.

The capitulescence length was measured on the main stem and was determined as distance between the point of insertion of the most basal glomerule and the branch apex.

Fieldwork was conducted with the main purpose of obtaining information on habitat and morphological features that are usually lost in dried specimens, such as plant architecture, involucre shape, and corolla color. We photographed plants in their habitat, with details of various morphological parts. The illustrations were prepared on the basis of herbarium material, using a camera lucida attached to a Wild M5 stereoscope, and later edited digitally in Adobe Illustrator and Photoshop.

Geographic distribution was obtained from herbarium material and recently collected specimens. Where no geographic coordinates were provided for herbarium specimens, they were estimated from the label information and placed in brackets.

The conservation status of the species was assessed under IUCN guidelines and criteria (IUCN 2018), based on georeferenced data. We used the geographic range criterion through an Area of Occupancy (AOO) assessment based on a user-defined cell width (2 km) (IUCN 2014). The conservation status was estimated using the GeoCAT—Geospatial Conservation Assessment Tool (Bachman *et al.* 2011). Given that *Baccharis rectialata* has a restricted geographical distribution and habitat, we consider the AOO to be a good predictor for its real distribution.

## Taxonomic treatment

*Baccharis rectialata* Valt., Bonif., G.Heiden & Marchesi, *sp. nov.* (Figs. 1–3)

**Type**:—URUGUAY. Treinta y Tres: Quebrada de los Cuervos, matorral en ladera alta rocosa, [32°55'4.36''S, 54° 27'23.59' W], 5 April 2017, pistillate, *V. Valtierra et al.* 320 (Holotype: MVFA!, isotype: ECT!).

**Subshrubs** 40 to 75 cm tall, profusely branched from the base, *stems* erect, minutely pubescent, grayish-green, surface glutinous, 3-winged, wings 0.7–6.8 × 0.15–0.35 cm, half-oblong (sometimes half-elliptic to half-ovate), margins straight or barely sinuous. *Leaves* reduced, alternate, spiral, sessile, 0.6–1.3 × 0.7–1.5 mm, triangular, base truncate, apex acute-attenuate, puberulous, glandular, margins entire. *Capitula* sessile, solitary or in clusters of 2 or 3 capitula, clusters arranged in pseudospikes 5–7.5 cm long, on terminal and lateral branches. **Staminate capitula** with involucre 3.5–4 × 3–3.7 mm, cylindrical, phyllaries in 5 to 6 series; outer phyllaries 1.2–1.5 × 1–1.3 mm, ovate, base truncate, apex acute, herbaceous, glandulous to resinous, minutely pubescent near to the central vein, margins ciliate, hyaline-membranaceous; inner phyllaries 3.8–4.1 × 0.6–0.8 mm, elliptic to obovate, base truncate, apex acute, herbaceous, minutely pubescent along the central vein towards the apex, margins ciliate at the apex, hyaline-membranaceous. **Receptacles** flat, fimbriolate. **Florets** 27 to 30, monoclinal, functionally staminate; corollas tubulose, white, 5-lobed, tube 1.8–2.3 mm long, cylindrical, slightly broadening towards the apex, lobes 1.5–1.8 mm long, triangular to narrowly elliptic, apex acute; anthers 1.1–1.2 mm long, base round, connective appendix 0.25–0.3 × 0.15–0.2 mm, ovate, apex acute; styles 4–4.9 mm long, style branches ca. 0.3 mm long, commonly fused, collector trichomes extending over

ca. 1 mm of style distal part, stylopodium present, nectary disc 0.4 mm high, ovary 0.2–0.3 mm long, rudimentary. **Pappus** 3.1–3.9 mm long, bristles 16 to 23, scabrid, frizzy and slightly flattened towards the apex, fused at the base, arranged in 1 series. **Pistillate capitula** with involucre 4.5–5.5 × 2.5–3.5 mm, cylindrical to urceolate, phyllaries in 5 to 7 series; outer phyllaries 1.4–1.6 × 1–1.1 mm, ovate, base truncate, apex acute, herbaceous, pubescent, resinous and glandulous, margins ciliate, hyaline-membranaceous; inner phyllaries 4–4.8 × 0.4–0.7 mm, narrowly elliptic to linear, base truncate, apex acute, herbaceous, pubescent towards the apex, margins entire at the base and ciliate towards the apex, hyaline-membranaceous. **Receptacles** flat to slightly convex, fimbriolate. **Florets** 27 to 95, declinuous, pistillate; corollas filiform, 2.4–3.4 mm long, white, limb ca. 0.3 mm long, 3-lobed, lobes obtuse, unequal; styles 3.5–3.7 mm long, style branches 0.5–0.6 mm long, narrowly elliptic, apex acute, stylopodium present. **Cypselae** 1–1.6 mm long, obconic, terete, 12–15-ribbed, surface covered with micropapillae, small carpodium present. **Pappus** 2.8–4.7 mm long, bristles 12 to 25, scabrid, slightly thinner towards the apex, fused at the base, arranged in 1 series, persistent.

**Etymology:**—The specific epithet refers to a defining feature of the new species, the nature of the wings which are all straight, with just barely sinuous margins.

**Distribution and habitat:**—In Uruguay, *Baccharis rectialata* has only been collected in the departments of Cerro Largo, Durazno, and Treinta y Tres (Fig. 3), where it grows in rocky grasslands at 150–250 m asl. The habitat includes rocky grasslands often associated with scrub largely dominated by *Baccharis dracunculifolia*, *Radlkoferotoma cistifolium* (Compositae), and *Dodonaea viscosa* (Sapindaceae). According to Lezama *et al.* (2019), the new species (identified in their paper as *Baccharis crispa* Sprengel (1826: 466)) occurs in sparsely-vegetated grasslands characterized by mesoxerophytic species developing on shallow or very shallow soils. According to Lezama *et al.* (2019), these communities are distinctive among several other grasslands hillside communities because of the presence of *Oxalis conorrhiza* (Oxalidaceae), *Chascolytrum erectum* (Poaceae), *Baccharis rectialata* and *Baccharis ochracea*. The new species seems to have a preference for rocky outcrops, although there is no evident geological correlation as we have found it in areas that vary from tectonically thrust slabs including impure limestones (calc-phyllites), quartzites and low grade phyllites (Hartmann *et al.* 2001), medium grade biotite-rich granitic gneisses (Bossi *et al.* 1998), highly cemented or lithified sandstones and conglomerates escarpments (Ferrando & Andreis 1982; Caorsi & Gofí 1958) or generic granitic outcrops (Hartmann *et al.* 2001).

**Phenology:**—Flowering from February to May, fruiting from June to August.

**Conservation assessment:**—*Baccharis rectialata* was categorized as Endangered (EN) in the AOO analysis. Only five scattered populations of this species have been found, associated with rocky grasslands developing on shallow soils. Only one of these populations occurs in a conservation area, the “Paisaje protegido Quebrada de los Cuervos” protected area, in Treinta y Tres, a department in eastern Uruguay (Fig. 3). The other populations that were identified occur in the areas where forestry with exotic species has significantly intensified in recent years.

**Taxonomic comments:**—*Baccharis rectialata* is morphologically similar to *B. trimeria* (Lessing 1831: 141) Candolle (1836: 425) and *B. crispa*, inhabiting similar habitats or, as in the case of *B. trimeria*, co-occurring with it. These three species share subshrubby habit, 3-winged stems profusely branched from the base, reduced leaves, and capitula arranged in glomerules along the terminal parts of main and lateral branches. However, *B. rectialata* differs from *B. trimeria* in its narrower wings and a shorter capitulescence and from *B. crispa* in its straight wing margins, shorter involucre and a shorter pappus in staminate capitula (see Table I).

The new species also resembles *Baccharis genistelloides* (Lamarck 1786: 93) Persoon (1807: 425), a species distributed along the Andes, from Colombia to northern Chile, in open grasslands at 3300–4800 m asl. Besides its clear ecological differences; *Baccharis rectialata* differs from *B. genistelloides* in its shorter involucre in staminate capitula (3.5–4 vs. 4.5–7.5 mm long), staminate florets with a shorter pappus (3.1–3.9 vs. 4.3–6.5 mm long), pistillate florets with a shorter pappus (2.8–4.7 vs. 5.3–10.5 mm long), shorter pistillate corollas (2.4–3.4 vs. 3.5–6.8 mm long), fewer pappus elements in pistillate florets (12–25 vs. 28–56), and in the number of pappus series in pistillate florets (one vs. several).

**Additional specimens examined (paratypes):**—**URUGUAY. Cerro Largo:** Arroyo de la Tigra, cerca de Cerro de las Cuentas, [32°36'35.77"S, 54°34'30.63"W], 2 March 1972, staminate, *O. Del Puerto* (MVFA 11103!). Establecimiento Peñarrosa, Al Norte de Arévalo, 10 km al Sur de Paso Pereira, 32°31'52.95"S, 55°10'42.52" W, 10 June 2016, pistillate, *C. Brussa & M. Alvarez* (MVJB 29922!). **Durazno:** Ruta 6 km 199, [33°19'20.83"S, 55°35'32.85"W], 23 February 1994, pistillate, *R. Brescia* (MVFA 23041!). **Treinta y Tres:** Estancia predios de forestación, 33°0'16.79" S, 54°13'9.09" W, 16 March 2017, staminate, *C. Pérez et al. 102* (MVFA!); 33°0'16.79" S, 54°13'9.09" W, 16 March 2017, pistillate, *C. Pérez et al. 103* (MVFA!). Quebrada de los Cuervos, 32°55'4.36"S, 54°27'23.59"W, 5 April 2017, staminate, *V. Valtierra et al. 321* (MVFA!).

**TABLE I.** Morphological comparison between *Baccharis rectialata* and closely related species occurring in Uruguay. Character states of *B. crispa* and *B. trimera* clearly contrasting with those observed in *B. rectialata* are highlighted in boldface.

	<i>Baccharis rectialata</i>	<i>B. crispa</i>	<i>B. trimera</i>
Plant height (cm)	40–75	15–32	40–75(280)
Wing width at lower end (mm)	1.5–3	2–4.5	5.5–11
Wing width at center (mm)	1.5–3.5	2.5–5.5	7.5–10
Wing width at upper end (mm)	1.5–2.5	2–4.5	3–6.5
Capitulescence length (cm)	5–7.5	3–8.5	9–21.5
Involucre length in staminate capitula (mm)	3.5–4	4.5–6	3.3–4
Involucre length in pistillate capitula (mm)	4.5–5.5	5–7	3.5–8
Pistillate corollas length (mm)	2.4–3.4	2.4–3.9	3.0–4.5
Pistillate styles length (mm)	3.5–3.7	2.5–4.8	3.7–6.1
Pappus length in staminate florets	3.1–3.9	4–4.8	3.5–4
Pappus length in pistillate florets	2.8–4.7	3.3–4.8	4.5–5

#### Key to the subshrubby species of *Baccharis* sect. *Caulopterae* s.s. occurring in Uruguay

- 1a. Wings width notably reduced towards the apex, basal width/ apical width > 2; involucre of pistillate capitula > 8.5 mm long ..... *B. riograndensis*
- 1b. Wings width uniform throughout the plant or gradually reduced towards the apex, basal width/ apical width < 2; involucre of pistillate capitula < 8 mm long ..... 2
- 2a. Wings basal width 1.5–4.5 mm wide ..... 3
- 2b. Wings basal width 5.5–15 mm wide ..... 4
- 3a. Wings margin notably sinuous, involucre of staminate capitula 4.5–6 mm long, involucre of pistillate capitula 5–7 mm long ..... *B. crispa*
- 3b. Wings margins straight or barely sinuous, involucre of staminate capitula 3.5–4 mm long, involucre of pistillate capitula 4.5–5.5 mm long ..... *B. rectialata*
- 4a. Wings 10 – 18 mm wide (immediately below capitulescence); pistillate capitula with 89 to 164 florets; flowering from September to November ..... *B. jocheniana*
- 4b. Wings 7.5–10 mm wide (immediately below capitulescence); pistillate capitula with 33 to 44 florets; flowering from February to May ..... *B. trimera*

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