Quasiantennaria (Asteraceae, Gnaphalieae), a new genus from the central Andes

Quasiantennaria (Asteraceae, Gnaphalieae), un nuevo género de los Andes centrales

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Abstract

Quasiantennaria R. J. Bayer & M. O. Dillon, a new genus from the central Andes distributed from Peru to Bolivia, is described and illustrated. It is characterized among Andean Gnaphalieae by its dioecious or polygamo-dioecious breeding system, cespitose, perennial herbs, basal rosulate leaves, capitulescences scapose, cymose-corymbose. It most closely resembles Antennaria Gaertn., a typically northern hemispheric genus; however, it differs in its achenial trichomes and relationships suggested by DNA sequence data.

Keywords: Asteraceae, Gnaphalieae, new genus, Bolivia, Peru, Andean flora.

Resumen

Quasiantennaria R. J. Bayer & M. O. Dillon, un nuevo género de los Andes centrales con distribución en Perú y Bolivia, se describe e ilustra para Perú. Se caracteriza entre las Gnaphalieae andinas por su sistema de reproducción dioico o polígamo-dioico, cespitosa, hierbas perennes, hojas basales en roseta, capitulescencias escaposas, cimoso-corymbose. Es muy cercano a Antennaria Gaertn. género típicamente del hemisferio norte; sin embargo, difiere en los tricomas de los aquenios y las relaciones filogenéticas sugeridas por datos de secuencia de ADN.

Palabras clave: Asteraceae, Gnaphalieae, nuevo género, Bolivia, Perú, flora andina.


Introduction

The Gnaphalieae (Cass.) Lecoq & Juill. (Asteraceae) is a small tribe comprising ca. 185 genera and 1240 species (Ward et al., 2009). In South America, some 20 genera and over 100 species are recorded with highest diversity in the tropical and subtropical Andean Cordillera (Dillon & Sagástegui-A., 1991a). Many have proliferated in upper elevation or alpine habitats in Peru (Dillon, 2005) and overwhelmingly they possess reduced, small cushions of tightly clustered basal densely canescent leaves. Genera can look remarkably similar, both in the field and as collections on herbarium sheets, but experience within these groups has shown that upon inspection, microcharacters can allow discrimination of genera, especially when combined with DNA sequence data (Luebert et al., 2017).

Species that have been attributed to Antennaria Gaertn. in South America, e.g., A. chilensis J. Rémy, A. magellanica Sch. Bip. (= Antennaria chilensis var. magellanica Reiche), and A. sleumeri Cabrera, have been considered as putative disjunctions from Northern Hemispheric taxa (Bayer et al., 1996). Recent next generation sequencing using hundreds of loci (Thapa et al., ined.) shows that Antennaria chilensis is a traditional Antennaria and is closely related to the Antennaria rosea Greene polyploid agamic complex. It was recovered as sister to Antennaria corymbosa E. Nels., which is a putative sexual progenitor of A. rosea (Bayer, 1990; Thapa et al., ined.). Antennaria sleumeri is an enigmatic species, known only from scant type material (LP) and until the species can be relocated, collected and studied further its relationships will likely remain cryptic. The remaining South American species, A. linearifolia Wedd., was recently included in analyses by Lu-
ebert et al. (2017) and Thapa et al. (ined.) and notably did not group with other authentic or traditional Antennaria species, i.e., A. chilensis, A. dioica (L.) Gaertn., and A. microphylla Rydb. (see Fig. 1, p. 1188 in Luebert et al., 2017).

Luebert et al. (2017) found that A. linearifolia was resolved in Clade L6 which included Jalcophila M. O. Dillon & Sagást., Loricaria Wedd., and Mniodes (A.Gray) Benth. (BPP: 1, MLB: 84). Jalcophila is sister to a clade with A. linearifolia, Loricaria and Mniodes (BPP: 1, MLB: 98). Relationships within the latter clade remain unresolved. Loricaria is well-supported (BPP: 1, MLB: 99) and Mniodes forms a well-supported monophyletic group (BPP: 1, MLB: 90). All other Antennaria were restricted to Clade L5 which contained Diaperia and sister to Clade L4 which contained Chevreulia Cass. and Cuatrecasasiella H. Rob.

Thapa et al. (ined.) conducted an analysis using hundreds of loci to reconstruct the phylogeny of 34 species of Antennaria including, A. linearifolia. Antennaria linearifolia fell clearly outside a strongly supported monophyletic traditional Antennaria, in an outgroup that contained four outgroup taxa, Mniodes schultzii (as Belloa), M. subspicata (as Luciiocline). Camoachatopsis alpina (Poepp. & Endl.) Anderb. & S. E. Freire, and Facelis lasiocarpa (Griseb.) Cabrera. The relationships of A. linearifolia to any of the outgroup taxa was unresolved (Thapa et al., ined.), however it is manifestly not an Antennaria.

Therefore, molecular data has suggested that Antennaria linearifolia, regardless of its overall morphology, was recovered in a clade together with Loricaria and Mniodes, while the remainder of Antennaria species form a separate clade (Luebert et al., 2017). This result was not apparent in the ITS analysis of Antennaria (Bayer et al., 1996), because material of A. linearifolia was not included in that study.

The distribution of the dioecious breeding syndrome has developed independently no fewer than seven times within the Gnaphalieae, viz. Antennaria, Loricaria, Mniodes, Cuatrecasasiella H. Rob., Parantennaria Beauverd, Pterygopappus Hook. f., Sinoleontopodium Y.-L. Chen (Anderberg, 1991) and is a good example of parallel evolution. Antennaria has a Holarctic (mostly North American) distribution, while Loricaria, Mniodes, and Cuatrecasasiella are South American, Parantennaria and Pterygopappus are Australian, and Sinoleontopodium is Asian (China). A recent ITS/ETS phylogeny (Nie et al., 2015) of the Gnaphalieae using 80% of the genera (835 species) in the tribe confirmed the independent origins of the dioecious Gnaphalieae. Sinoleontopodium was described because its dioecious nature made it an “atypical” Leontopodium (Chen, 1985), however, it is clearly shown to be imbedded within traditional Leontopodium (Nie et al., 2015) by the molecular data, have been upheld as distinct from Antennaria. The evolution of the dioecious trait in the Gnaphalieae seems to be associated with the high elevation, usually cushion plant habit, and is therefore not always a trustworthy indicator of phylogenetic relatedness. Much taxonomic confusion in the Gnaphalieae has been caused because dioecy has been used as a strong taxonomic character, assumed to be homologous.

Therefore, as A. linearifolia cannot remain in traditional Antennaria and its relationships to other genera remain unclear, we propose that the taxon be moved to a new genus, Quasiantennaria.
Results

Quasiantennaria  R. J. Bayer & M. O. Dillon, gen. nov.

TYPE: Quasiantennaria linearifolia (Wedd.) R. J. Bayer & M. O. Dillon

Dioecious or more rarely polygamo-dioecious, perennial herbs; stems simple, ascending or erect, tomentose or lanate. Basal leaves rosulate, oblanceolate to spatulate, entire; cauline leaves alternate, smaller. Capitulescences cymose-corymbose, racemose, or glomerulate, terminal, occasionally of a solitary head. Capitula discoid or rarely disciform; involucres ovoid or campanulate; phyllaries imbricate, scarios, the outer gradually narrowing, the inner prolonged into a petaloid lamina; receptacles convex to plane, ealeaceous; pistillate florets with corollas filiform, white or lilac, truncate or subdente; staminate florets with corollas tubular, 5-lobed or 5-dentate, the anther bases sagittate, caudate, the terminal appendages ovate, the styles undivided or briefly bifid, the branches truncate. Achenes cylindrical or ellipsoidal, rounded or subcompressed, sessile, biseriate, capitate-glandular trichomes; pappus bristles uniseriate, scabrid, barbellate, fused at base or free, apices clavellate (staminate) or acute (pistillate).

A monotypic genus that contains the following species:

Quasiantennaria linearifolia (Wedd.) R. J. Bayer & M. O. Dillon, comb. nov.


Description: Dioecious or rarely polygamo-dioecious, perennial herbs, rhizomatous; stems unbranched, 5-15(-30) cm tall. Leaves basal, rosulate, sessile; blade oblanceolate-linear, 2-8 cm long, 1.5-3 mm wide, the lower surface densely tomentose, the upper surface glabrescent, the margins entire. Capitulescences glomerulate, subtended by foliaceous bracts. Capitula 5-7 mm high, 3-5 mm wide, discoid, homogamous, rarely disciform and heterogamous; involucres campanulate; phyllaries 4-5-seriate, the outer ovate, 3-4 mm long, ca. 2.5 mm wide, apex obtuse, the inner obovate to oblong-lanceolate, 4-5 mm long, 1-2 mm wide, the apex prolonged into a white, petaloid lamina; masculine capitula with 40-50 functionally staminate florets, the corollas narrowly tubular, 3-3.5 mm long; feminine capitula with 50-60 pistillate florets, the corollas filiform, 2.5-3 mm long; heterogamous capitula disciform with 50-60 pistillate florets, the corollas filiform, 2.5-3 mm long, functionally staminate florets 6-8, the corollas narrowly tubular, 3.5-4 mm long. Achenes cylindrical, 0.5-0.7 mm long, pubescent with sessile,

biseriate, capitate-glandular trichomes, ca. 40 µm long, ca. 55 µm wide (Fig. 6D, 7); pappus bristles ca. 3.5 mm long, apices clavellate (staminate) (Fig. 8, right) or acute (pistillate) (Fig. 8, left).
Etymology: From the Latin quasi-(about, as if, just as if, as though) and Antennaria. Originally described as if it were an Antennaria to which it bears a superficial resemblance particularly in its dioecious breeding system.

Distribution:

Quasiantennaria linearifolia is distributed throughout the central cordillera in Peru from Departments of Amazonas to Cusco, and northern Bolivia; (2700-) 3100-4500 (-5000) m. Collections determined as Q. linearifolia (as Antennaria) have been recorded from Ecuador, both at MO and US; however, in this study, we have not examined any authentic material from Ecuador. Ecuadorian collections have thus far proven to be either Pseudognaphalium or Mniodes; therefore, the distribution in Ecuador is represented as putative records on the distribution map (Fig. 10).

Discussion

Collections of this species are commonly misidentified as Antennaria or Gnaphalium (inc. Pseudognaphalium). Quasiantennaria shares a dioecious or polygamo-dioecious reproductive system and dimorphic pappus bristles, as in Antennaria, and possessed white, showy phyllary apices and basal leaves (Fig. 9). Microcharacters of the achenial trichomes are quite different, with Antennaria having clavate trichomes ca. 40 µm long, ca. 15 µm wide (Fig. 6B, C) and those in Quasiantennaria are globose, wider than long, ca. 40 µm long, ca. 55 µm wide (Fig. 6D, 7).

In Peru Q. linearifolia is known as champito, a name applied to many rosulate or cespitose species of Asteraceae.

Nomenclatorial notes: Quasiantennaria linearifolia has been confused with the heterogamous taxon currently treated as Pseudognaphalium antennarioides (DC.) Anderb. or other potential Pseudognaphalium species. They have been confused in both identification of herbarium material and promulgated in the literature. They both have gray, basal leaves and spicate capitulescences with clustered heads; however, the similarities between these two taxa are purely superficial. Pseudognaphalium antennarioides was proposed for a taxon with heterogamic capitula containing numerous pistillate florets and ca. 15 central, hermaphroditic florets (Humboldt & Bonpland s.n., P00322319). The latter taxon often has stolons or lateral stems and the erect flowering stems are often more leafy and without obvious internodes.

Dillon & Sagástegui (1991b) placed Gnaphalium sedoides F. W. Klatt under the synonymy of Antennaria linearifolia; however, in retrospect, this taxon may be a member of Pseudognaphalium. The final placement of this collection will await additional study. Gnaphalium sedoides F. W. Klatt, Linnaea 42: 135. 1878-79. TYPE: Peru, J. Dombey 252 (holotype: P (P00704538), F neg. 37609; isotype: GH (GH10008364).

Specimens examined: BOLIVIA.


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Prov. Huaraz: Cerro San Cristóbal, NE of Huaraz, 8 Jul 1985, 3800 m, D. Smith & M. Buddensiek 11010 (F-1961103, p.p., MO).

Dept. Cajamarca: Prov. Paucartambo, Acjanaco, 4 May 1990, 3600 m, A. Cano E. 3440 (F-2044360); Parque Nacional Manu, 19 Mar 1992, A. Cano E. 5125 (F-210409); Tres Cruces, 3330-3500 m, A. Gentry, M. Dillon, P. Berry, & J. Aronson 23439 (MO-2726315); Corihuayrachina, Callanga, 3800 m, F. Woytkowski 565 (MO).


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**Contribution of the authors**

R.J.B: Redaction of the text, evaluation, methodology, taxonomic determination of the species, review and approval of the final text. M.O.D.: Fieldwork, redaction of the text, taxonomic determination of the species.

**Conflicts of interests**

The authors declare not to have
conflicts of interests.

**Literature cited**


Fig. 2. Quasiantennaria linearifolia. Syntypes: Dombey s.n. (P01816271, P01816272)
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![Image of Quasiantennaria linearifolia](image)

**Fig. 3.** *Quasiantennaria linearifolia*. Lectotype: chosen here from syntypes: Dombey s.n. (P01816271).
Fig. 4. *Quasiantennaria linearifolia*. Isotypic collection MA (MA816408). Note that Friedrich Walter Domke annotated the sheet as “*Gnaphalium antennarioides* DC.” a taxon unrelated to *Q. linearifolia*. 
Fig. 5. Illustration of *Antennaria linearifolia* (Chloris Andina, Plate 24, C (1, habit; 2, male floret; 3, anther; 4, style branch apices; 5, male pappus bristle).
Fig. 6. Achenial trichomes. A. SEM of Antennaria parvifolia Nutt. achene, white scale bar = 100 µm. B. Close-up of achenial trichomes, white scale bar = 10 µm (adapted from Luebert et al., 2017, Fig. 2, A & B, p 1190). C. Antennaria neodioica (=A. howellii Greene) achenial trichomes, ca. 40 µm long, ca. 16 µm wide (redrawn from Porsild, 1931, Fig. 3). D. Quasiantennaria linearifolia, ca. 40 µm long, ca. 55 µm wide, illustration drawn from light microscope preparation (Voucher: Lopez & Sagástegui 8208, F).
Fig. 7. *Quasiantennaria linearifolia*. A. SEM of aborted achenes from male floret, white scale bar = 10 mm. B. Close-up of achenial trichomes, white scale bar = 50 μm. (Voucher: Ferrerya 5766, F).
Fig. 8. *Quasiantennaria linearifolia* pappus bristle apices. Left pistillate (female) bristle apex. Right staminate (male) bristle apex.
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Fig. 9. Quasiantennaria linearifolia. Photograph taken by A. Sagástegui (Voucher: Sagástegui et al. 17317 (F)).
Fig. 10. Distribution of *Quasiantennaria linearifolia*. Verified distributional records from Bolivia and Peru = ⭕️. Unverified distributional records from Ecuador = □️ (see text).