

TAXONOMY

A new combination and a new species of Andean Mutisieae (Asteraceae)

Gisela Sancho¹, Susana E. Freire¹, Liliana Katinas¹ & María C. Tellería²

¹ División Plantas Vasculares, Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina. sancho@fcnym.unlp.edu.ar (author for correspondence); freire@museo.fcnym.unlp.edu.ar; katinas@museo.fcnym.unlp.edu.ar

² División Paleobotánica, Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina. telleria@netverk.com.ar

Gochnatia lanceolata was described on the basis of two collections: the type (*Carolina 01*) from Peru and a paratype (*Torrico & Peca 336*) from Bolivia. The morphological characters analyzed here (e.g., style branches, apical anther appendages, phyllaries, pollen, and leaf anatomy) show that these specimens belong to different taxa. A new combination in *Chucoa* (*Chucoa lanceolata*) is proposed for the type collection from Peru. A new species, *Gochnatia angustifolia*, is described on the basis of the paratype from Bolivia.

KEYWORDS: Asteraceae, *Chucoa*, *Gochnatia*, Compositae, Mutisieae, Peru, Bolivia, taxonomy.

INTRODUCTION

The genus *Gochnatia* is characterized by its usually homogamous and discoid capitula, the tubular, deeply 5-lobed corollas, apiculate apical anther appendages, and dorsally smooth style branches (Cabrera, 1971). *Gochnatia* Kunth with 68 species is one of the largest genera of the tribe Mutisieae (Asteraceae). Despite its high number of species, all taxa of *Gochnatia* share two characters: apiculate apical anther appendages and dorsally smooth style branches (Cabrera, 1977; Freire & al., 2002). Recently, Beltrán & Ferreyra (2001) described the new species *Gochnatia lanceolata*.

Gochnatia lanceolata H. Beltrán & Ferreyra was described on the basis of two collections: *Carolina 01* from Peru and *Torrico & Peca 336* from Bolivia. The purpose of this paper is to show that the type and paratype of *Gochnatia lanceolata* belong, not only to different species, but to different genera as well.

Our analysis of the type of *Gochnatia lanceolata* (*Carolina 01*) from Peru reveals characters that differ from those typical for *Gochnatia*. Specifically, *Gochnatia lanceolata* has apically obtuse (not apiculate) anther appendages and conspicuously papillate (not smooth) style branches, thus differing from *Gochnatia*. This suggests the exclusion of *Gochnatia lanceolata* from *Gochnatia*. However, the paratype of *Gochnatia lanceolata* (*Torrico & Peca 336*), has apiculate anthers and dorsally smooth style branches, characters that correspond to the genus *Gochnatia*. These, and other strong dissimilarities between the two specimens of *Gochnatia lanceolata* are shown in Table 1.

The type collection *Carolina 01* belongs to *Chucoa*

(Cabrera) (Mutisieae) by its homogamous capitula with all corollas tubular, obtuse apical anther appendages, and conspicuously dorsally papillate styles. The paratype collection of *Gochnatia lanceolata* (*Torrico & Peca 336*) from Bolivia belongs to *Gochnatia*, but it is here excluded from *Gochnatia lanceolata*.

Here we propose the new combination *Chucoa lanceolata* on the basis of the type collection *Carolina 01* (*Gochnatia lanceolata*) and a new species, *Gochnatia angustifolia*, based on *Torrico & Peca 336* (the paratype collection of *Gochnatia lanceolata*).

MATERIALS AND METHODS

Vegetative and floral parts were dissected and observed after boiling in water and stained with 2 % safranin. Free-hand sections of leaves were made and then stained with safranin. Drawings were done using a stereomicroscope Wild M5 and a microscope Leitz SM Lux with camera lucida technique.

Pollen was acetolysed in the standard way, chlorinated, and mounted in glycerol jelly (Erdtman, 1960). Measurements of the polar (P) and equatorial (E) diameters of 25 pollen grains and measurements of exine thickness of 15 pollen grains were made under immersion oil at 1000× magnification. The P/E ratio was calculated for each specimen. For scanning electron microscopy (SEM), acetolyzed pollen grains were suspended in 90% ethanol and mounted on stubs and examined in a JEOL JSM T-100 SEM. The terminology in general follows Punt & al. (1994), and the size classification was taken from Erdtman (1969).

Table 1. Main morphological and anatomical characters that distinguish the two collections on which *Gochnatia lanceolata* was described.

	Type (<i>Carolina 01</i>)	Paratype (<i>Torricon & Peca 336</i>)
Leaf orientation	spreading	erect (straight and upright)
Leaf shape	lanceolate	linear-elliptic
Leaf margins	denticulate	entire
Leaf surfaces	subglabrous	glandular (pilose at the margins)
Leaf stomata position	sunken	raised
Leaf secretory ducts	present	absent
Leaf mesophyll	bifacial	isolateral
Outer phyllaries	ovate with acute apices	lanceolate with acuminate apices
Anther apical appendage	lanceolate-obtuse	long-apiculate
Style branches (external surface)	conspicuously papillate	smooth
Pollen ratio P/E	prolate	spheroidal-subprolate
Pollen shape (polar view)	triangular or subtriangular	circular
Pollen endoaperture	lalongate with acute ends	lalongate with horns
Pollen exine sculpture	scabrate-slightly microechinate	microechinate-echinate

THE NEW SPECIES

Chucoa lanceolata (H. Beltrán & Ferreyra) Sancho, S. E. Freire & Katinas, **comb. nov.** Basionym: *Gochnatia lanceolata* H. Beltrán & Ferreyra, *Compositae Newslett.* 36: 26. 2001. – Typus: Peru. Departamento Arequipa, Provincia Castilla, Andagua, arbustivo de 1.80 m de altura, hojas coriáceas, flores blanco-amarillentas, sobre suelo arenoso, no pedregoso, 3600–3700 m, s. d., *Carolina 01* (holotype, USM not seen; isotype, US!). Figs. 1, 3 A, B.

Shrubs c. 1.8 m tall, branched; stems glabrous. Leaves alternate, spreading, those at the bottom of the branches deciduous, subsessile or sessile, blade 4–6 × 0.6–1.3 cm, coriaceous, lanceolate, base attenuate, apex acute, margins denticulate, the surfaces subglabrous, glandular (biseriate) and non-glandular trichomes scarce. Capitula solitary, homogamous, discoid, c. 50-flowered, shortly pedunculate, the peduncles 5–10 mm long; involucre campanulate, 1.5–2.5 × 2–2.7 cm, phyllaries 4–5-seriate, graduate, coriaceous, resinous, centrally dark, margins cream-coloured, the outer ones c. 7 × 3 mm, ovate, acute at the apex, the inner ones, c. 19 × 1.2 mm, linear-oblong. Receptacle epaleate. Florets c. 50, bisexual, corolla cream-coloured, tubular-funnelform, 22–23 mm long, deeply 5-lobed, the lobes 7–8 mm long, coiled, shortly papillate at the apex. Anthers 11–11.5 mm long, long-caudate, tails pilose, apical appendage lanceolate-obtuse. Style branches 3–3.5 mm long, dorsally conspicuously papillate on the upper part. Cypselae cylindrical, 5-costate, 6–8 mm long, glabrous or with very few glandular biseriate trichomes. Pappus triseriate, bristles 12–17 mm long, stramineous, scabrid, of unequal length, the innermost series somewhat broadened proxi-

mally. Pollen tricolporate, prolate (P × E = 68–79 × 42–44 μm), triangular or subtriangular in polar view, endoaperture lalongate with acute ends, exine sculpture scabrate-slightly microechinate.

This species has only been collected in the region of Andagua, Castilla Province, Arequipa Department in Peru, where it occurs in sandy soils from 3,500 to 3,700 m.

Chucoa was described from Peru (Cabrera, 1955) and, until now, has been treated as unispecific, containing *Chucoa ilicifolia* Cabrera. Here we expand *Chucoa* to include a second species. Within the tribe Mutisieae, *Chucoa* is the only genus with homogamous capitula with all actinomorphic tubular corollas, lanceolate-obtuse apical anther appendages, and conspicuously dorsally papillate style branches. Transverse sections of the leaves in *C. lanceolata* and *C. ilicifolia* show both species have bifacial leaf mesophyll, and *C. lanceolata* has sunken stomata (vs. raised stomata in *C. ilicifolia*), and secretory ducts (vs. leaves without secretory ducts in *C. ilicifolia*). The two species differ in the cypselae pubescence, being glabrous or with very few glandular biseriate trichomes in *C. lanceolata*, and constituted by double or twin hairs in *C. ilicifolia*. Pollen features also support the placement of the new species in *Chucoa* (Katinas & al., in prep.). Both *Chucoa lanceolata* and *C. ilicifolia* (P × E = 68–78 μm × 47–50 μm) have prolate pollen, elliptic to subrectangular shape in equatorial view, subtriangular shape in polar view, colpi long with psilate margins and a scarcely microgranulate membrane, an endoaperture with acute ends, a mesoaperture diffuse, scabrate or scarcely microechinate sculpture pattern, and *Mutisia*-type of exine structure, with the ectosexine thicker than endosexine and very stout endosexine columellae.

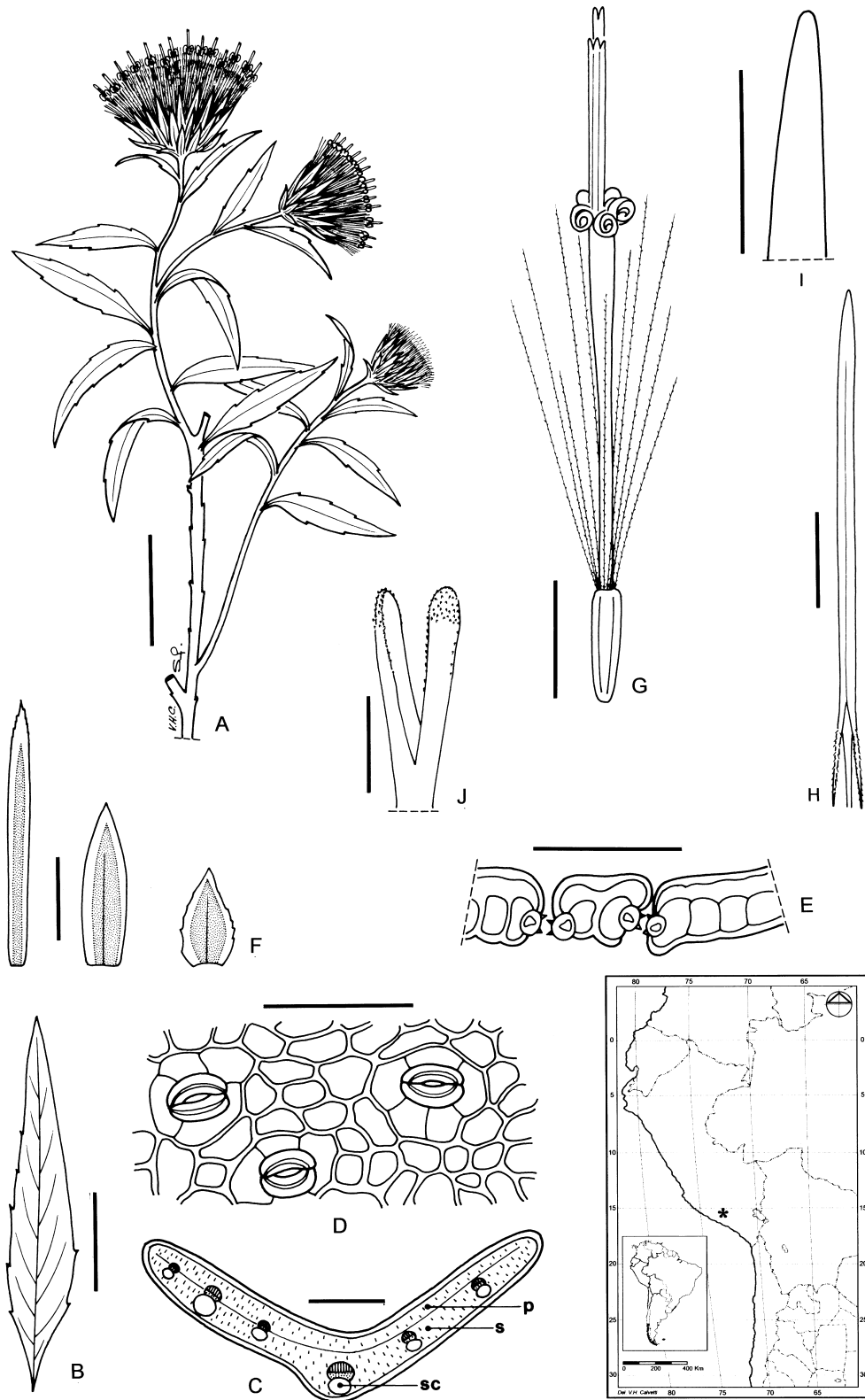


Fig. 1. *Chucoa lanceolata*. A, habit; B, leaf; C, leaf showing bifacial structure (p, palisade tissue; s, spongy tissue) with secretory cavities (sc); D, leaf surface, showing thick anticlinal cell walls; E, leaf epidermis showing stomata sunken in pit formed by the thick outer wall; F, phyllaries; G, floret; H, stamen; I, anther apical appendage; J, style branches. A–E, G–I, drawn from *Carolina 01* (US); F, redrawn from Beltrán & Ferreyra (2001). Scale bars: A = 3 cm; B = 1.5 cm; C, I = 1mm; D, E = 0.1 mm; F, G = 5 mm; H, J = 2 mm.

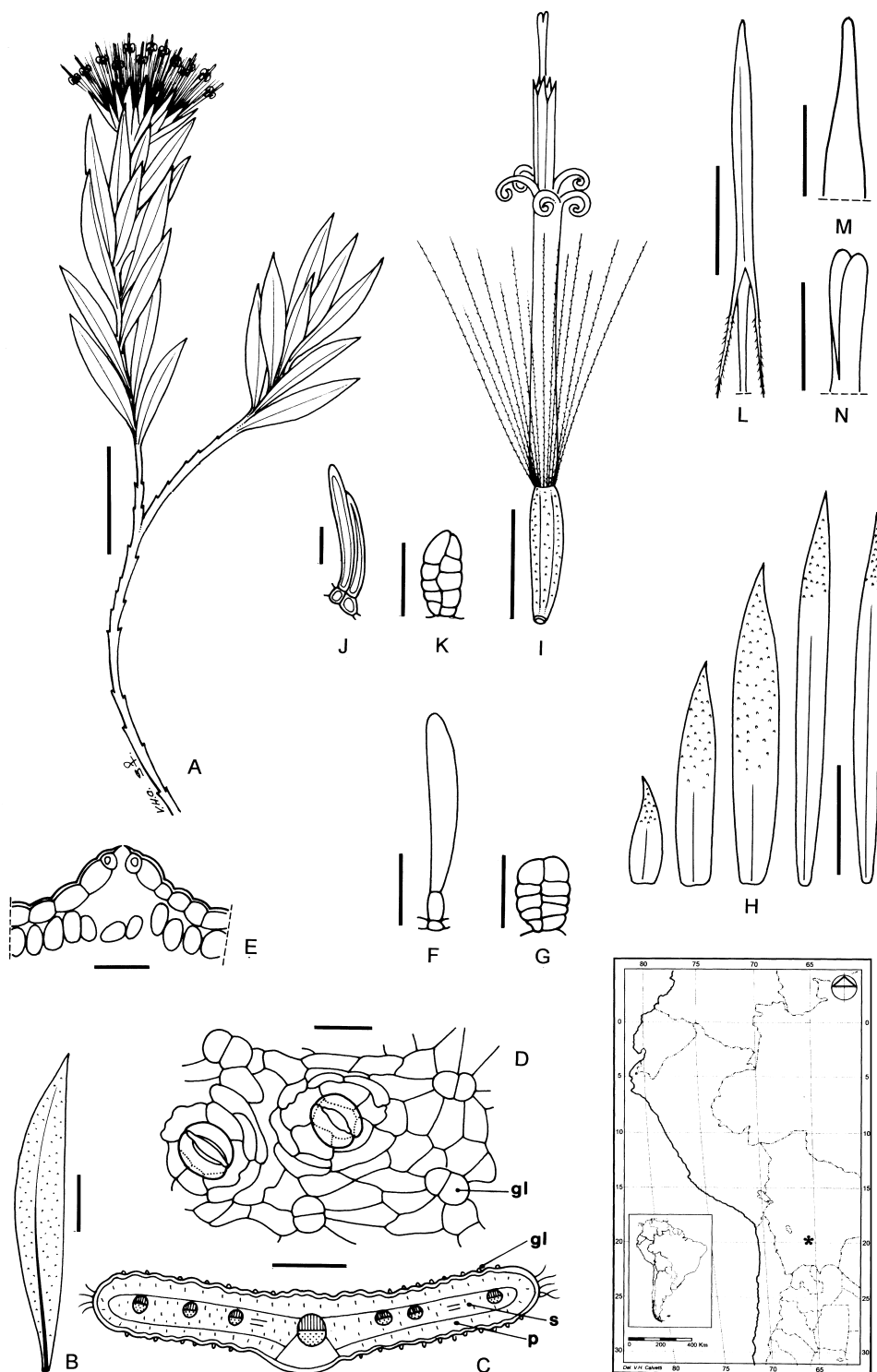


Fig. 2. *Gochnatia angustifolia*. A, habit; B, leaf; C, leaf in cross-section showing isolateral structure (p, palisade tissue; s, spongy tissue) with glandular trichomes (gl) on both surfaces and non glandular trichomes on margins; D, abaxial leaf surface showing stomata and glandular trichomes (gl); E, leaf epidermis in cross-section showing raised stomata; F, non-glandular trichome of leaf; G, biseriate glandular trichome of leaf; H, phyllaries; I, floret; J, twin hair trichome of cypsela; K, biseriate glandular trichome of cypsela; L, stamen; M, anther apical appendage; N, style branches. Drawn from Torrico & Peca 336 (LPB). Scale bars: A = 3 cm; B = 0.5 cm; C = 0.1 cm; D–G, J, K = 0.05 mm; H, I = 5 mm; L = 2.5 mm; M = 0.5 mm; N = 1.5 mm.

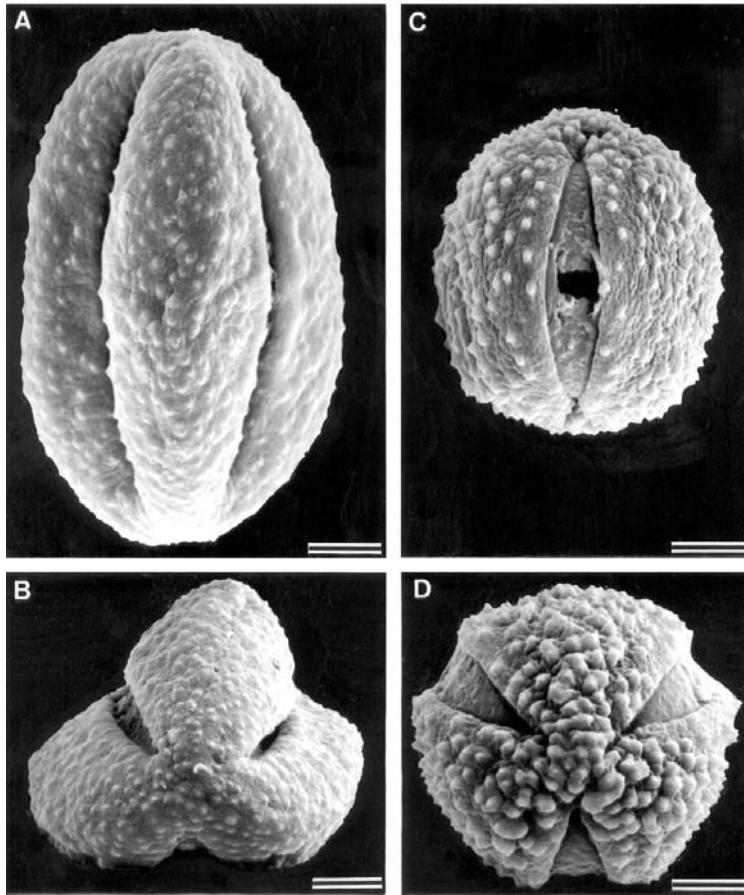


Fig. 3. SEM pollen micrographs. A, B, *Chucoa lanceolata*, Carolina 01 (US); C, D, *Gochnatia angustifolia*, Torrico & Peca 336 (LPB); A, C, equatorial views; B, D, polar views. Scale bars: 10 μ m.

Key to the species of *Chucoa*.

1. Leaves densely tomentose abaxially, margins spiny. Capitula 15–20-flowered, long-pedunculate (peduncles to 10 cm long); anthers with smooth tails and papillate filaments *Chucoa ilicifolia*
1. Leaves subglabrous on both surfaces, margins denticulate. Capitula c. 50-flowered, short-pedunculate (peduncles 0.5–1 cm long); anthers with plumose tails and smooth filaments *Chucoa lanceolata*

Gochnatia angustifolia Sancho, S. E. Freire & Katinas, **sp. nov.** – Typus: Bolivia, Depto. Potosí, Prov. José M. Linares Lizarazu, Jatun Palmar, 2750 m, 5 Apr 1993, Torrico & Peca 336 (holotypus, LPB!; isotypus, US!). Figs. 2, 3C, D.

Quoad capitulum in spicibus ramulorum solitarium, phyllarium nec villosum et pappum pilosum pilis inaequalibus ad *Gochnatia rotundifolia* accedit, sed ab ea differt foliis lineari-ellipticis integris glandulosis apicibus acutis basibus attenuatis et flosculis in numero minori.

Shrubs c. 1.2 m tall, branched; stems glabrous. Leaves alternate, erect, sessile, blade 3.5–4.5 \times 0.6–1.3 cm, coriaceous, linear-elliptic, base attenuate, apex acute-mucronate, margins entire, the surfaces densely covered by glandular trichomes (biseriate), with a few non-glandular trichomes (conical) on the margins. Capitula solitary, homogamous, discoid, c. 20-flowered, surrounded by leaves, subsessile; involucre cylindrical, 2–2.2 \times 1.3–1.5 cm, phyllaries 4–5-seriate, graduate, papery, purplish at the apex, covered by glandular biseriate trichomes, the outer ones c. 10 \times 2 mm, lanceolate, acuminate at the apex, subcoriaceous, the inner ones, c. 17 \times 1.5 mm, linear-oblong to oblanceolate. Receptacle epaleate. Florets c. 20, bisexual, corolla cream-coloured, tubular-funnelform, 17–19 mm long, deeply 5-lobed, the lobes c. 6 mm long, coiled. Anthers c. 7 mm long, long-caudate, tails pilose, apical appendages long-apiculate. Style branches c. 1.5 mm long, dorsally smooth. Cypselae cylindrical, 5-costate, 6–6.5 mm long, covered by short glandular biseriate trichomes, twin-hairs very few. Pappus biseriate, bristles

11.5–13 mm long, stramineous, hispidulous-scabrid, all of the same width, about half of them (the outer) shorter than the inner ones. Pollen tricolporate, spheroidal-subprolate ($P \times E = 47\text{--}56 \mu\text{m} \times 42\text{--}46 \mu\text{m}$), circular in polar view, endoaperture lalongate with horns, exine sculpture microechinate-echinate.

This species has been collected in the Andes of southwestern Bolivia at 2750 m.

Because of features in common with *Gochnatia rotundifolia* Less. (e.g., shrubs, solitary capitula, and pappus of thin bristles, all of the same width, about half of them shorter than the others), we recognize *G. angustifolia* as the second species of *Gochnatia* sect. *Rotundifolia* S. E. Freire, Katinas & Sancho (Freire & al., 2002). Members of this section have a disjunct distribution, with *Gochnatia angustifolia* inhabiting the Bolivian Andes and *G. rotundifolia* endemic to the coastal states of southern Brazil. A similar disjunction is present in *Gochnatia* sect. *Hedraiophyllum* (Less.) DC. (Freire & al., 2002).

Gochnatia angustifolia has linear-elliptic glandular leaves and thus resembles *G. foliolosa* Hook. & Arn. and *G. glutinosa* Hook. & Arn., both of sect. *Pentaphorus* (D. Don) DC. (Cabrera, 1971; Freire & al., 2002). However, *Gochnatia angustifolia* differs from these two species by its solitary (vs. glomerate) capitula and the pappus bristles all of the same width (vs. about half of the bristles wider than the others).

Key to the species of *Gochnatia* sect. *Rotundifolia*.

1. Leaves orbicular, subglabrous on both surfaces; phyllaries dorsally subglabrous with ciliate margins; capitula c. 50-flowered *Gochnatia rotundifolia*
1. Leaves linear-elliptic, glandular on both surfaces; phyllaries dorsally glandular; capitula c. 20-flowered *Gochnatia angustifolia*

Compos. Newsl. 36: 26–30.

- Cabrera, A. L.** 1955. Un nuevo género de Mutisieas del Perú. *Bol. Soc. Argent. Bot.* 6: 40–44.
- Cabrera, A. L.** 1971. Revisión del género *Gochnatia* (Compositae). *Rev. Mus. La Plata* 12, Bot. 66: 1–160.
- Cabrera, A. L.** 1977. Mutisieae—systematic review. Pp. 1039–1066 in: Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds.), *The Biology and Chemistry of the Compositae*, vol. 2. Academic Press, London.
- Erdtman, G.** 1960. The acetolysis method, a revised description. *Svensk Bot. Tidskr.* 54: 561–546.
- Erdtman, G.** 1969. *Handbook of Palynology — An Introduction to the Study of Pollen Grains and Spores*. Munksgaard, Copenhagen.
- Freire, S. E., Katinas, L. & Sancho, G.** 2002. *Gochnatia* (Asteraceae, Mutisieae) and the *Gochnatia*-complex: taxonomic implications from morphology. *Ann. Missouri Bot. Gard.* 89: 524–550.
- Punt, W., Blackmore, S., Nilsson, S. & Le Thomas, A.** 1994. *Glossary of Pollen and Spore Terminology*. Laboratory of Palaeobotany and Palynology, Univ. Utrecht, Utrecht.

ACKNOWLEDGEMENTS

The authors wish to thank S. G. Beck of LPB, and V. A. Funk of US, for allowing us to study the material. We are also grateful to: J. Pruski and one anonymous reviewer for the useful comments on the manuscript; Daniel Giuliano for reviewing the Latin description; and V. H. Calvetti for inking the illustrations. This work was supported by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina.

LITERATURE CITED

- Beltrán, H. & Ferreyra, R.** 2001. Una nueva especie de Asteraceae para Perú y Bolivia: *Gochnatia lanceolata*.