

## Rediscovery and lectotypification of *Philonotis brevifolia* Herzog (Bartramiaceae, Bryophyta), a neglected species from Chile

Soledad JIMENEZ<sup>a,b\*</sup>, Guillermo M. SUÁREZ<sup>a,c</sup> & Juan LARRAÍN<sup>d</sup>

<sup>a</sup>Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)

<sup>b</sup>Instituto de Botánica del Nordeste, Sgto. Cabral 2131, C.C. 209, Corrientes, Argentina

<sup>c</sup>Facultad de Ciencias Naturales e I.M.L., Miguel Lillo 205, San Miguel de Tucumán, Tucumán, Argentina

<sup>d</sup>Instituto de Biología, Facultad de Ciencias, Pontificia Universidad Católica de Valparaíso, Campus Curauma, Chile

**Abstract** – As part of the revision of *Philonotis* in South America, a sample collected in Chile perfectly matched the type specimen of *P. brevifolia* Herzog. This species described from Chile was considered conspecific with *P. krausei* (Müll. Hal.) Broth. by Seki, but is resurrected here on the basis of the shape, apex, margin of the leaves, the shape of the laminal cells and the position of the papillae on these cells. A lectotype is designated for *P. brevifolia*, and a detailed and illustrated description is provided, including the traits of new discovered male plants, amending the original description.

**Chile / perigonal leaves / *Philonotis krausei* / revalidation / taxonomy**

**Résumé** – Dans le cadre d'une révision du genre *Philonotis* en Amérique du Sud, un échantillon récolté au Chili correspond parfaitement au type de *P. brevifolia* Herzog. Cette espèce décrite du Chili était considérée conspécifique avec *P. krausei* (Müll. Hal.) Broth. par Seki, mais elle est ici considérée comme distincte sur base de la forme, de l'apex et des marges de la feuille, de la forme des cellulaires laminaires, et de la position de papilles sur ces cellules. Un lectotype est désigné pour *P. brevifolia*, et une description détaillée et illustrée sont présentées, dont les caractères des plantes mâles nouvellement découvertes, complétant ainsi la description originale.

**Chili / feuilles périgoniales / *Philonotis krausei* / revalidation / taxonomie**

Herzog (1954) described *Philonotis brevifolia* based on samples collected by the German naturalist Gerhard Helmut Schwabe in Aysén (Chile). He characterized the species by the ovate and concave leaves with a short-acuminate apex and serrate

\* Corresponding author: soledadjimenez@conicet.gov.ar

margins, the percurrent to short-excurrent costae, and the short-rectangular laminal cells with papillae at the proximal end. Seki (1974) considered the species to be conspecific with *P. krausei*, a species diagnosed by the lanceolate leaves with acuminate apex, serrate margins with slightly to clearly recurved, double-serrate, long-excurrent costae, and narrow-rectangular to sub-linear laminal cells. Both taxa share the slightly double-serrate margins, that are at least weakly recurved at the apex, and it seems this sole character led to the taxonomic proposal by Seki (1974) for the synonymization of both names. Despite the genus has been well studied regionally in Southern South America, this name has been ignored in the only available local treatment of the group (Matteri, 1968), and has never been used again.

We examined the type specimens of *P. brevifolia* from JE and Matteri-LIL, which consist of sterile, abundant and well-preserved plants. The species appears clearly distinct from *P. krausei*, and should therefore be resurrected as an independent entity (see discussion below). Due to its abundance and excellent condition, and for being housed at the herbarium where the author of the species worked, the specimen JE04008355 is considered to be the most suitable lectotype. In addition, a recent fertile collection of *P. brevifolia* made in Capitán Prat (Chile) by the authors allows us now to describe its sexuality and male gametangia.

A detailed description of the species, illustrations from light and scanning electron microscopes, ecological comments, and a distribution map are here provided.

## RESULTS

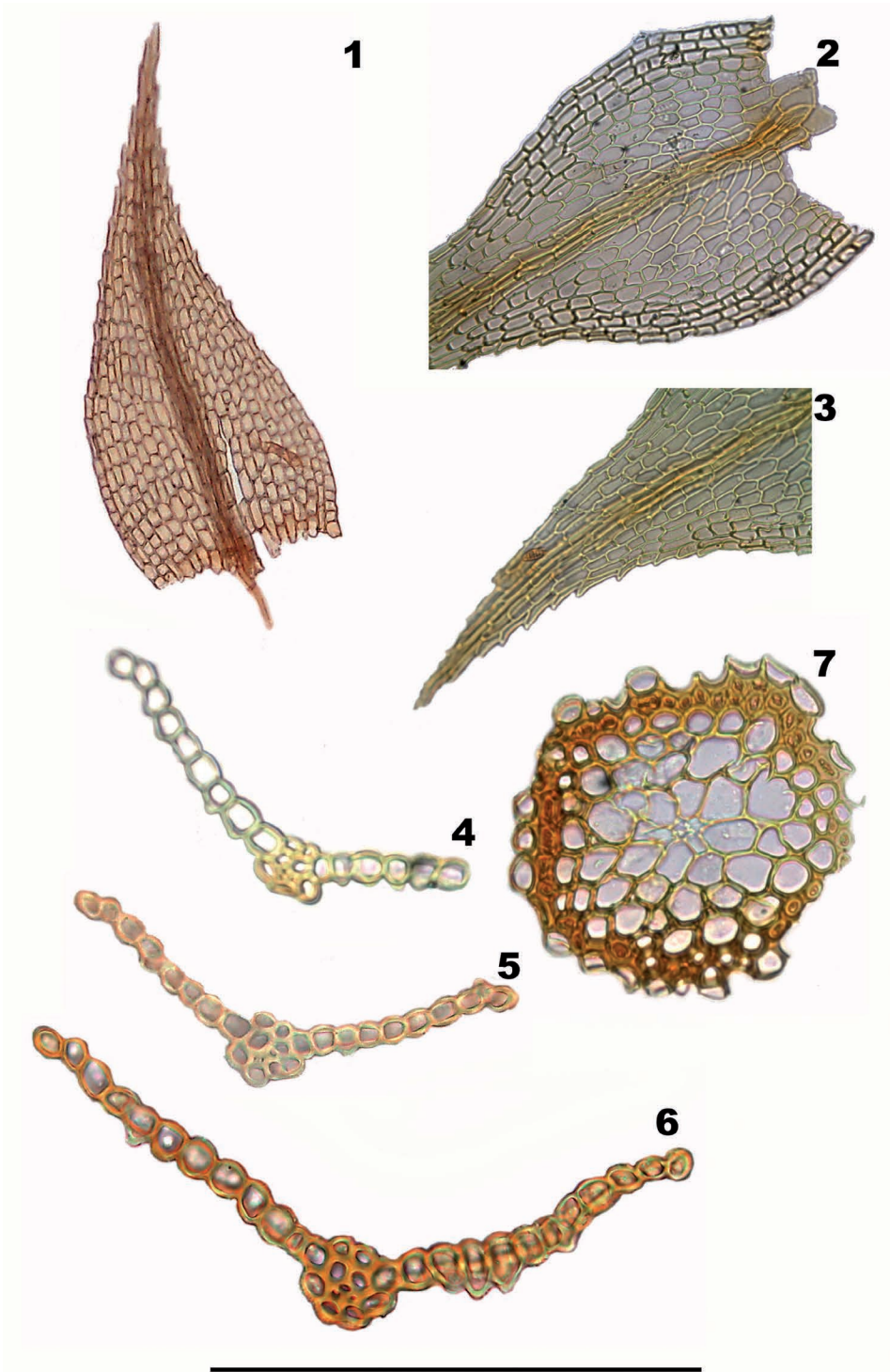
*Philonotis brevifolia* Herzog, *Revue bryologique et lichénologique* 23: 79. 1954.

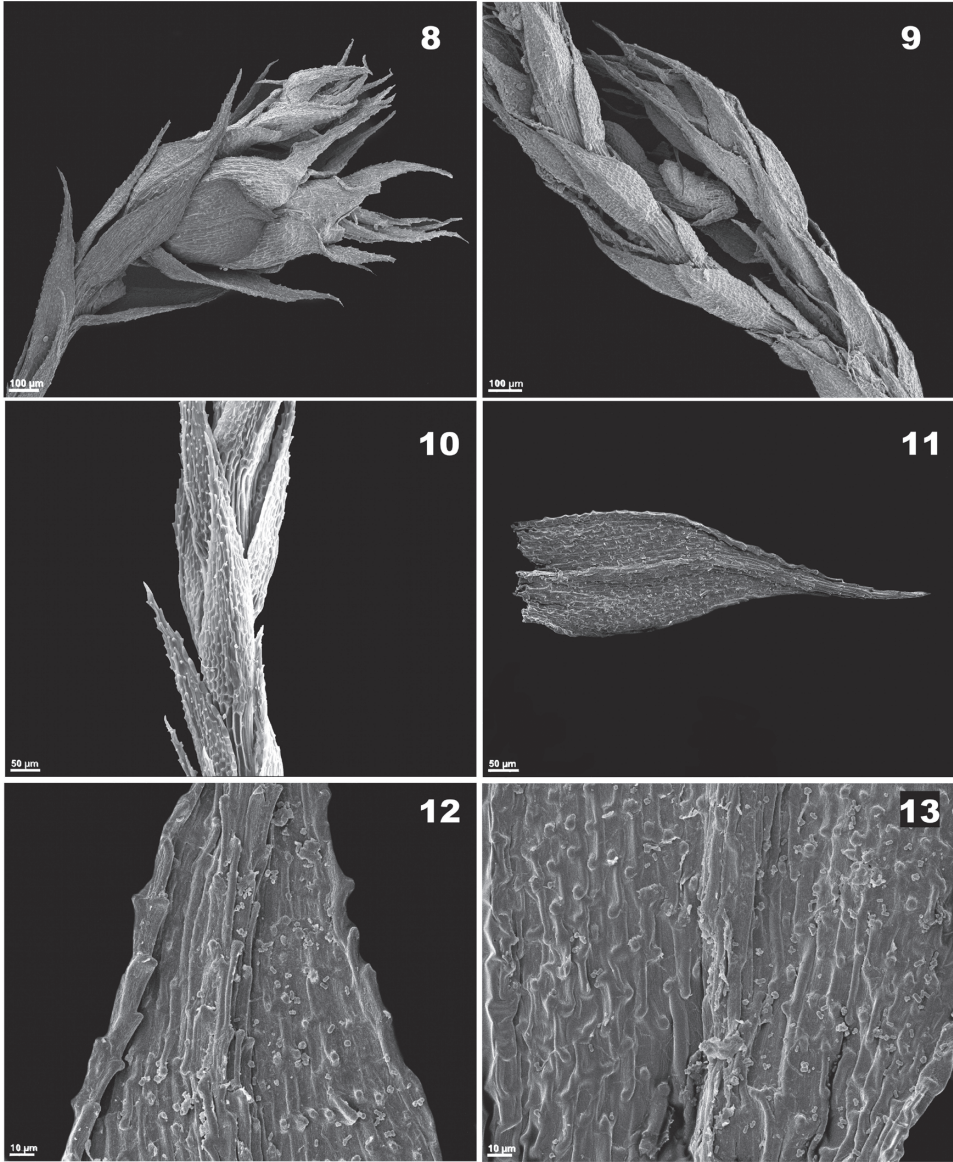
**Figs 1-13**

**Type citation:** [Chile] Westpatagonien: Pto. Aysen, auf feuchter Erde, leg. G. H. Schwabe, n° 45/b. **Type:** Fl. v. Westpatagonien Pto. Aysén. Leg. Schwabe n°45/b, 22.3.40 (Lectotype, designated here JE! (JE04008355), isolectotype Matteri-LIL!)

**Plants** small, green to reddish-green, growing in dense turfs. **Stems** reddish-brown, scarcely tomentose below, branched in sub-floral whorls, 1.0-1.2 cm long, transverse section rounded, sclerodermis in 2 rows, hyalodermis present; central strand faintly developed; **axillary hairs** 12-15 µm long, 2-celled, brown basal cell short, apical cell hyaline and sub-globose; **rhizoids** smooth, micronematal apparatus present. **Leaves** appressed when dry, erect-spreading when wet, laxly spaced, ovate-lanceolate, 0.5-0.8 × 0.2-0.3 mm, apex acuminate to acute; margin serrate to double-serrate in the upper half, entire in the lower half, slightly recurved in upper 2/3 of lamina; costae well defined, 27-33 µm wide, percurrent to short-excurrent, in cross-section rounded, with 2 or 3 guide cells in one layer, dorsal stereids in one layer, with dorsal and ventral epidermis; upper laminal cells oblong-rectangular, 18-25 × 8-10 µm, papillae at distal cell ends, basal cells rectangular-oblong, 25-33 × 10-

Figs 1-7. *Philonotis brevifolia*. **1.** Vegetative leaf. **2.** Leaf base showing papillae at proximal cell ends. **3.** Leaf apex showing papillae at distal cell ends. **4-6.** Leaf cross sections. **7.** Stem transverse section. Scale bar: 1: 0.5 mm; 2-7: 100 µm (All from Larrain & Vargas 26508 CONC, CTES).





Figs 8-13. Scanning electron micrographs of *Philonotis brevifolia*. 8. Perigonia gemmiform. 9. Sub-floral innovations. 10. Vegetative branch. 11. Vegetative leaf. 12. Leaf apex. 13. Leaf base (All from Larrain & Vargas 26508 CONC, CTES).

12 µm, papillae at proximal cell ends. Propagules absent. **Dioicous.** **Perigonia** gemmiform, yellowish-orange, sub-tended by a whorl of 2 or 3 branches, perigonial leaves ovate-lanceolate,  $1.0 \times 0.3$  mm, papillae at the proximal angles, turning distal at the apex; paraphyses clavate. Female plants and sporophytes unknown.



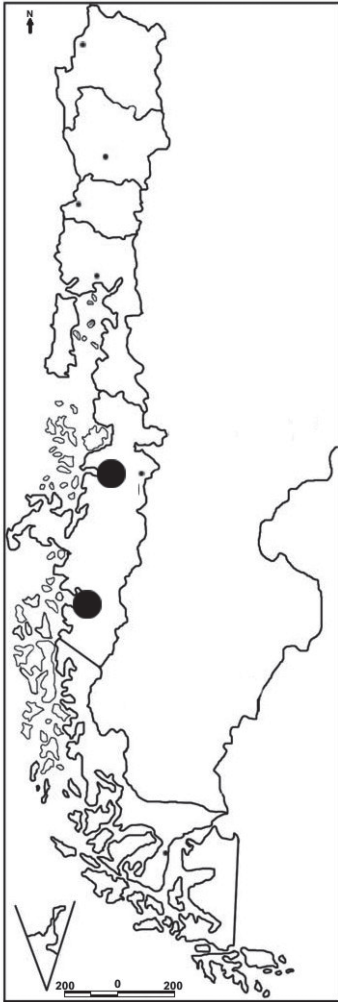


Fig 14. Geographic distribution of *Philonotis brevifolia*.

**Additional specimen examined.** Chile: Provincia Capitán Prat, Puerto Yungay, en el estacionamiento del campamento militar del Cuerpo Militar del Trabajo (CMT), 47°56'00"S, 73°19'27"W; alt. ca. 20 m; entre piedras en el suelo, 16/1/2007, Larrain & Vargas 26508 (CONC, CTES).

**Habitat and geographical distribution.** *Philonotis brevifolia* is an austral species restricted to Southern Chile. It is a small plant that forms compact and low cushions on soil, found in areas of anthropogenic disturbance (Fig. 14).

## DISCUSSION

By the proximal position of the papillae, the ovate-lanceolate leaves and the serrate margin, *Philonotis brevifolia* is well positioned in the section “*Philonotis*” (Koponen, 2015), which corresponds to the section “*Euphilonotis*” of Brotherus (1904). This species is considered here as distinct from *P. krausei* (see Table 1) primarily based on the ovate-lanceolate leaves with a percurrent to short-excurrent costa in *P. brevifolia*, versus lanceolate leaves with a long-excurrent costa in *P. krausei*. Furthermore, the laminal cells in *P. brevifolia* are oblong-rectangular, but rectangular to sub-linear in *P. krausei*. The latter has large and, branched rhizoids that are produced around branch primordia and at the base of buds (macronemata type) whereas in *P. brevifolia*, these are short, small, thin, sparsely branched and produced on the stem between leaves (micronematal type).

Based on comparison of its vegetative body with that of other Neotropical and African species, *Philonotis brevifolia* is similar and may be closely related to *P. sharpiana* (Griffin & Buck, 1989), *P. tricolor* (Koponen, 2015) and *P. cernua*. *Philonotis sharpiana* differs from *P. brevifolia* primarily by the revolute margin from base to apex, and the linear to rectangular laminal cells. *Philonotis cernua* is distinguished from *P. brevifolia* by its synoicous sexual condition and the linear to quadrate-rectangular shape of the laminal cells, whereas *P. tricolor* has double-serrate marginal teeth, crenulate toward the base of the leaf, the rectangular to rhomboidal laminal cells, and the discoidal perigonia.

**Acknowledgements.** This research was supported by PIUNT, PIP 0078, PICT 1838 and SGCyT (Project 12P002). The authors gratefully acknowledge the curators of herbaria for the loan of the samples.

Table 1. Morphological traits distinguishing *Philonotis brevifolia* and *P. krausei*

	<i>P. brevifolia</i>	<i>P. krausei</i>
Leaf shape	ovate-lanceolate	lanceolate to ovate-lanceolate
Leaf margin	serrate to double-serrate, weakly revolute	serrate to double-serrate, weakly revolute
Leaf apex	acuminate to acute	acuminate
Costae	percurrent to short-excurrent	excurrent
Apical laminal cells	oblong-rectangular	rectangular to sub-linear
Basal laminal cells	rectangular-oblong	rectangular
Papillae position	proximal angles, turning distal at the apex	proximal angles
Propagules	absent	present (microphyllous branches)
Rhizoids	micronematal apparatus	macronematal apparatus

## REFERENCES

- BROTHERUS V.F., 1904 — Bartramiaceae. In: Engler, A. & Prantl K. (eds), *Die Natürlichen Pflanzenfamilien*. Leipzig, W. Englemann.
- GRIFFIN III D. & BUCK W. R., 1989 — Taxonomic and phylogenetic studies on the Bartramiaceae. *The bryologist* 92: 368-380.
- HERZOG T., 1954 — Zur Bryophytenflora Chiles. *Revue bryologique et lichénologique* 23: 27-99.
- KOPONEN T., 2015 — Notes on *Philonotis* (Bartramiaceae, Musci). 15. *Philonotis* on Mt. Kilimanjaro, Tanzania. *Arctoa* 24: 382-388.
- MATTERI C.M., 1968 — Las especies de *Philonotis* (Bartramiaceae) del sur de la Argentina. *Revista del Museo Argentino de ciencias naturales Bernardino Rivadavia* 3: 185-234.
- SEKI T., 1974 — A moss flora of Provincia de Aisén, Chile. Results of the Second Scientific Expedition to Patagonia by Hokkaido and Hiroshima Universities, 1967. *Journal of science of Hiroshima University, Series B, Div. 2*, 15: 9-101.