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Neosharpiella aztecorum H.Rob. *et* Delgad. (Gigaspermaceae), new to the bryophyte flora of South America

Soledad JIMENEZ[a,b], Magdalena SCHIAVONE[c], Guillermo SUÁREZ[a,c] & Claudio DELGADILLO[d]*

[a]Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)

[b]Instituto de Botánica del Nordeste, Sgto. Cabral 2131, C.C. 209, Corrientes, Argentina

[c]Facultad de Ciencias Naturales e I.M.L., Miguel Lillo 205, San Miguel de Tucumán, Tucumán, Argentina

[d]Instituto de Biología, UNAM, Apartado Postal 70-233, Ciudad Universitaria, 04510 México, D.F., México

Abstract – *Neosharpiella aztecorum* H.Rob. *et* Delgad., a species originally described from Mexico, and subsequently found in South Africa, is recorded for the first time for South America from Argentina. Photomicrography of spore morphology, capsule, and leaves observed by LM and SEM are here presented. A distribution map of the species in the Latin America is also included.

Africa / Argentina / distribution / Mexico / mosses / *Physcomitrium turgidum* / *Quathlamba* / Tucumán

Résumé – *Neosharpiella aztecorum* H.Rob. *et* Delgad., une espèce initialement décrite pour le Mexique, et plus tard trouvée en Afrique du Sud, est enregistrée pour la première fois en en Argentine et par conséquent en Amérique du Sud. Les photomicrographies obtenues en microscopies optique et électronique de la morphologie des spores, de la capsule, et des feuilles sont présentées. Une carte de distribution de l'espèce en Amérique latine est donnée.

Afrique / Argentine / distribution / Mexico / mousses / *Physcomitrium turgidum* / *Quathlamba* / Tucumán

INTRODUCTION

Neosharpiella H.Rob. *et* Delgad. (Gigaspermaceae) includes acrocarpous mosses with leaves ovate to ovate-lanceolate, cucullate, with a reduced or absent costa; capsule rugose and gymnostomous; a very short, cucullate calyptra; and

* Corresponding author: soledadjimenez@conicet.gov.ar

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large, very opaque and coarsely verrucate spores. This genus was originally described by Robinson & Delgadillo (1973) as a member of the Funariaceae based on a species from the highlands of Mexico, *N. aztecorum* H.Rob. *et* Delgad., and it also included a second species, *N. turgida* (Mitt.) H.Rob. *et* Delgad., originally described as *Physcomitrium turgidum* Mitt. from Ecuadorian samples collected by Jameson. The last one was also reported from Bolivia (Robinson & Delgadillo, 1973) and Chile (Fife, 1980). Based on a set of characters considered anomalous to the Funariaceae, such as the sexual condition, the presence of a very weak costa and a cucullate caliptra, the stomata enclosed by two guard cells, and the size of the spores, Fife (1980) included *Neosharpiella* in the Gigaspermaceae.

On the other hand, Magill (1987) described the genus *Quathlamba* Magill (Bartramiaceae), based on specimens collected at high elevation in Lesotho in southern Africa. The type species, *Q. debilicostata* Magill, was subsequently considered to be conspecific with *N. aztecorum* by Robinson *et al.* (2001) and these authors retained the genus in the Gigaspermaceae. On the other hand, for Goffinet *et al.* (2009) the latter genus still belongs in the Bartramiaceae.

Among the specimens collected in high grassland in northwestern Argentina, some were determined as *N. aztecorum*, a species previously unknown in South America. A complete description, photomicrographs of its morphological characters, a distribution map, and comments on this plant are here provided.

MATERIALS AND METHODS

In this work were studied samples collected in Tucumán province and other specimens deposited in CTES, LIL, and MEXU. The specimens were analyzed morphologically with conventional techniques for bryophytes and mounted in water-glycerine-phenol or Hoyer's solution (Anderson, 1954).

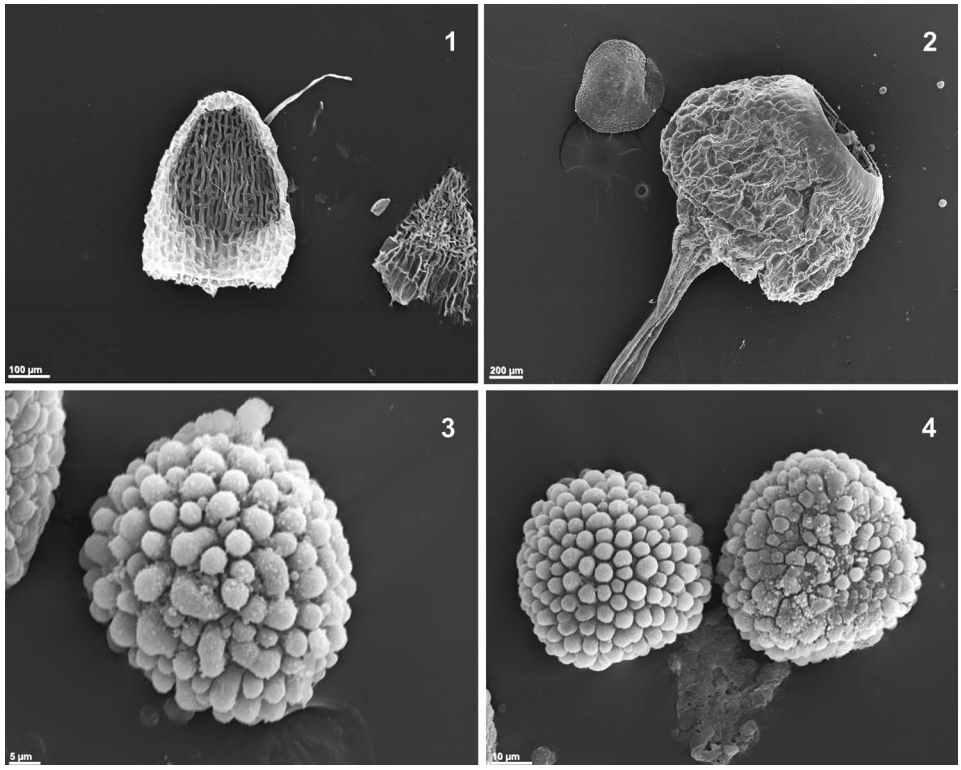
Microscopic characters were analyzed by using light microscopy (LM) Leica Model CME, and scanning electron microscopy (SEM) JEOL 5800 LV operating at 20 KV. The SEM images were obtained from samples fixed in FAA, critical-point dried, and then mounted on double-sided tape and coated with gold-palladium.

RESULTS

Neosharpiella aztecorum H.Rob. *et* Delgad. **Figs 1-8**

The bryologist 76: 537, *f. 1-12*. 1973. Type citation: [North America] Mexico. Tlaxcala: N facing slope of La Malinche, alpine, moist, soil, 11 Sept. 1968, *Delgadillo 2599a*. [Holotype: US (not seen); isotype: MEXU!].
Quathlamba debilicostata Magill, *Fl. S. Africa, Bryophyta* 2: 421, *f. 120*. 1987. Type citation: [Africa]. Lesotho: top of Sani Pass, on soil of rock crevices along northern cliff face just E of Mountain Lodge, 2800 m, *Magill 4512* [Holotype: MO (not seen); isotype: PRE (not seen)]. First synonymized by Robinson *et al.* (2001: p. 134).

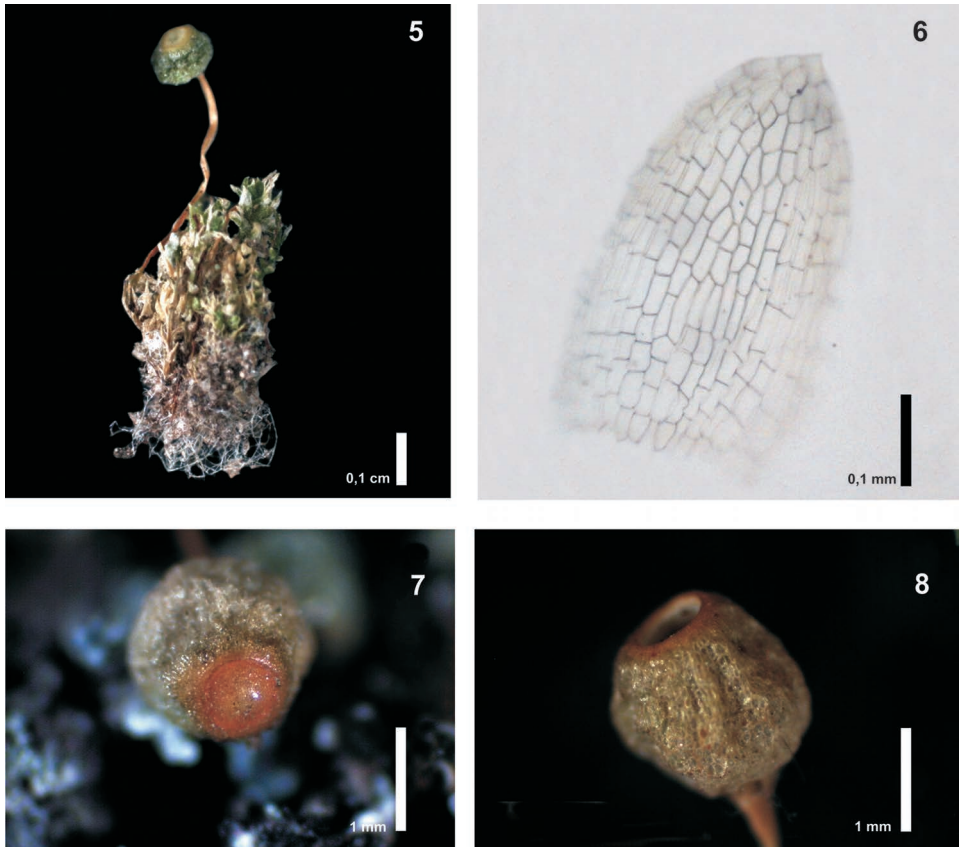
Plants small, to 0.4-0.5 cm long, green to yellowish-green, growing sparsely on soil. **Stem** rhizomatous, yellowish-green, transverse section rounded, 95 μm in diameter, hyalodermis absent, sclerodermis absent; central strand



Figs 1-4. SEM micrographs of *Neosharpiella aztecorum.* **1.** Vegetative leaf. **2.** Capsule and operculum. **3.** Spore, distal view. **4.** Spores, distal and proximal view. (All from *Suárez 1737*, LIL).

present, 27 µm in diameter, well developed. **Rhizoids** hyaline, smooth. **Axillary hairs** 3-cells, basal cells short and brown, apical cells hyaline and subglobose, 38 µm long. **Leaves** erect when dry, erect-spreading when wet, ovate to oblong, concave, 0.5-1.2 × 0.3-0.4 mm; apex cucullate, ending on a single cell; margin entire; **costae** absent to weakly developed, ending at midleaf; upper laminal cells rectangular to rhomboidal, 71-91 × 20-22 µm; basal cell long-rectangular, 45-60 × 22-25 µm, thin-walled, smooth.

Synoicous. Gametangia subtended by a whorl of 2-4 branches, **perichaetial leaves** 0.7 × 0.6 mm, ovate-lanceolate, concave, apex acuminate; margin entire, plane; **costae** absent; areolation similar to vegetative leaves; paraphyses filiform. **Setae** reddish-brown, 0.4-0.6 cm long, twisted; **capsules** yellowish-brown, spherical, 1.6-2.3 × 0.6-2.2 mm, erect, irregularly rugose; exothecial cells at mid urn 78-105 × 56-60 µm, oblong-rectangular to hexagonal, thin-walled; annulus absent; stomata present in 3-4 rows at the base of the capsule, enclosed by two guard cells; **operculum** plane; **peristome** absent. **Calyptra** cucullate, deeply purplish-brown at the apex and changing gradually to brownish-yellow to hyaline at the base, entirely purplish-brown in mature capsules, 420-470 × 230-238 µm. **Spores** subsphaerical, reddish-brown, 53-63 µm diameter; densely verrucose, verrucae 3.0-3.3 µm long.



Figs 5-8. LM micrographs of *Neosharpiella aztecorum.* **5.** Habit. **6.** Vegetative leaf. **7.** Operculate capsule. **8.** Deoperculate capsule (All from *Suárez 1737*, LIL).

Specimens examined: ARGENTINA. TUCUMÁN, Tafí del Valle, ruta 307, km 78, El Infiernillo, 26º48'S, 65º43'W, 2500 m, 30 August 2013, *G. Suárez 1737* (CTES, LIL, MEXU). MEXICO. 20 km NE de Jiquipilco, carretera a Temoaya, 19º34'N, 99º31'W, 3510 m, 3 May 1985, *A. Cárdenas S. 4118* (CTES, MEXU).

Habitat: *Neosharpiella aztecorum* is known from the high volcanoes of central Mexico, in alpine, open, moist soil (Robinson & Delgadillo, 1973), in exposed or shaded soil or soil-covered rocks and crevices, and in *Pinus* forests, between 3300-4100 m in elevation. In Argentina, it was found growing in grassland between 20º and 30ºS latitude at 2500 m, on a sandy slope exposed to the sun, next to the road. This collection area is dominated by *Festuca orthophylla* Pilg. (Poaceae), *Lobivia bruchii* Britton *et* Rose (Cactaceae), and a wide variety of mosses covering nearby volcanic boulders (Suárez *et al.* 2010). According to Magill (1987), in southern Africa the species was found in alpine site in rock crevices shaded by other vegetation.

Geographical distribution: México (Robinson & Delgadillo, 1973), southern South America (Argentina), South Africa (Magill, 1987; Robinson *et al.*, 2001) (Fig. 9). *Neosharpiella aztecorum* is a typical Afro-American montane species. This distribution pattern is shown by no less than 74 species of liverworts (Gradstein,

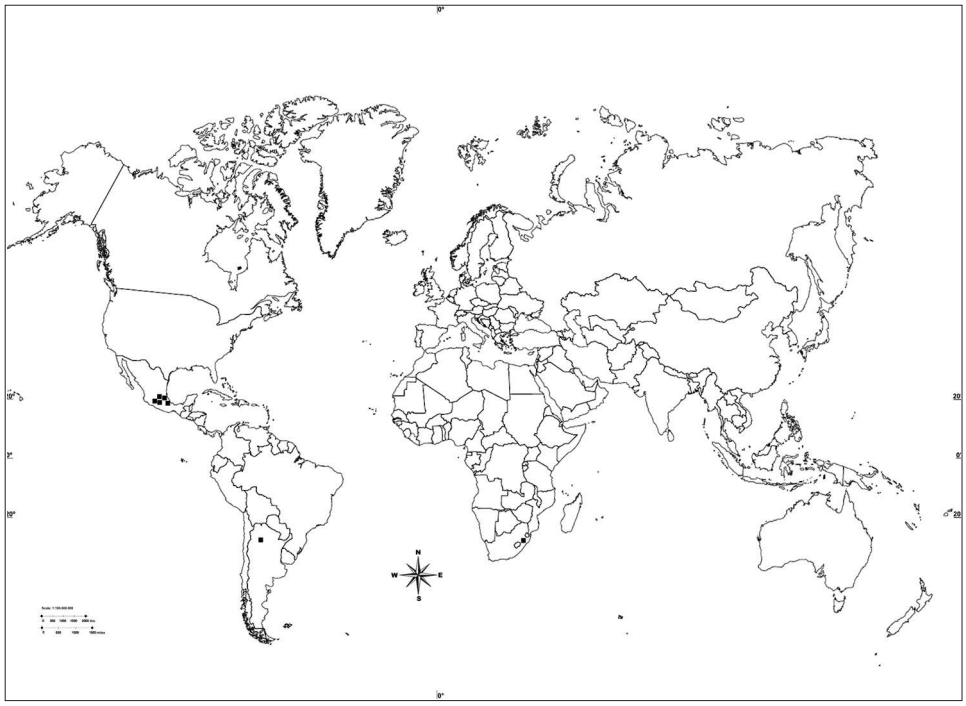


Fig. 9. Global distribution map for *Neosharpiella aztecorum.*

2013) and over 45 species of mosses (e.g. Buck & Griffin, 1984; Ochyra *et al*., 1992; Delgadillo, 1993; Suárez & Schiavone, 2008), although this number is increasingly larger and larger with progress in taxonomic studies on tropical and subtropical mosses and exploration of understudied regions in the Neotropics and Africa.

Observations: In the Mexican specimen analyzed for comparison, we noted a slight predominance of the ovate-lanceolate leaves, but we could not find significant differences with the sample collected in Argentina.

The taxonomic position of *Neosharpiella* is still uncertain (Robinson *et al*. 2001), with authors placing it in the Gigaspermaceae or in the Bartramiaceae, as noted above.

Geographically, the genus may be considered of southern derivation by virtue of the disjunct distribution of *N. aztecorum* in Argentina and Africa, and by the presence of *N. turgida* elsewhere in South America (Ecuador, Bolivia, and Chile).

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