

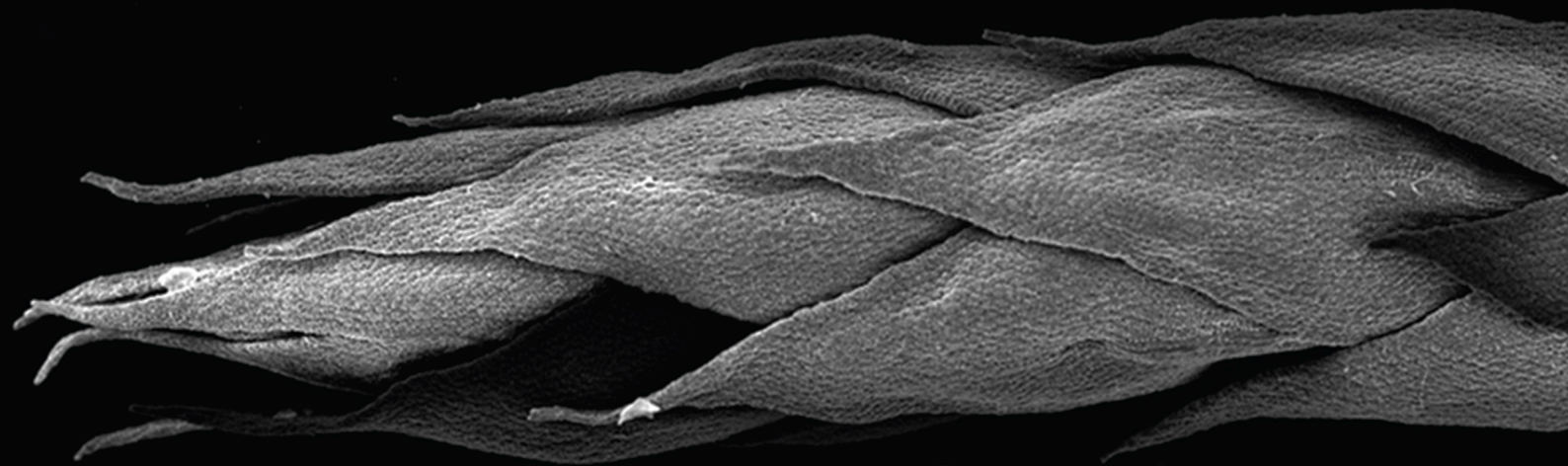
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### Two disjunct moss species new to Mexico

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# Two disjunct moss species new to Mexico

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Grimmiaceae,  
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distribution,  
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## MOTS CLÉS

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distribution,  
disjonction.

## ABSTRACT

*Meteorium flexicaule* Wils. in Hook. and *Aligrimmia peruviana* R.S. Williams are newly recorded for the Mexican moss flora. The former is briefly described and illustrated from a collection in San Luis Potosí (Ahuacatlán); the latter was collected in Nevado de Toluca, state of Mexico. Previous continental reports for both species are South American.

## RÉSUMÉ

*Deux espèces de mousses disjointes nouvelles pour le Mexique.*

*Meteorium flexicaule* Wils. in Hook. et *Aligrimmia peruviana* R.S. Williams sont nouvellement rapportées pour la flore des mousses du Mexique. La première est brièvement décrite et illustrée à partir d'une récolte de San Luis Potosi (Ahuacatlán); la seconde a été récoltée à Nevado de Toluca, État de Mexico. Les précédentes récoltes continentales de ces deux espèces sont sud-américaines.

## INTRODUCTION

Disjunct mosses are frequent in the Mexican moss flora; many are shared with Africa (Delgadillo 1993) or have tricontinental or pantropical ranges. In the Americas there is a group of species known from Mexico and South America, but not from Central America, with such conspicuous examples as *Aloinella catenula* Cardot, *Leptopterigynandrum tenuicaule* (R.S. Williams) S. He, *Macrocoma frigida* (Müll. Hal.) Vitt, *Orthotrichum trachymitrium* Mitt., and *Syrhophodon elongatus* Sull. Species with this pattern may extend their distribution further south along the mountains.

This contribution concerns two disjunct species that are distributed in Mexico and South America. One of them, *Meteorium flexicaule* Wils. in Hook., although described in various treatments, has not been illustrated. Line drawings and SEM illustrations are provided. *Aligrimmia peruviana* R.S. Williams was described and illustrated by Murray (1984). Both are additions to the Mexican flora.

## MATERIAL AND METHODS

Among unidentified collections from cloud forests in eastern Mexico there was a specimen collected in 1978 that we failed to name until Bruce Allen identified it as *Meteorium flexicaule*. The specimen is in good condition but bears no sporophytes and continued attempts to obtain supplementary material from the source locality (San Luis Potosí) or from other cloud forests in Mexico, have failed. Light microscope examination and SEM analysis were used to characterize the morphological features of this taxon.

In late 2018, a mixed sample was brought to my attention by Jorge Romero, a student working on moss tardigrades in the highlands of central Mexico. The specimen contained several stems of *Aligrimmia peruviana* in poor condition. However, its morphology is so distinct that the record is justified despite the size and condition of the sample.

The specimens supporting this study were deposited at MEXU.

## RESULTS

### *Meteorium flexicaule* Wils. in Hook.

*Flora Novae-Zelandiae* 2: 101 (1854).

**SPECIMEN EXAMINED.** — Mexico. San Luis Potosí, 3 km W of Ahuacatlán, c. 21°18'N, 99°04'W, 22.V.1978, in a second growth cloud forest on sunny dry *Liquidambar* tree trunk, Delgadillo 3766 (MEXU, MO).

**DISTRIBUTION.** — *Meteorium flexicaule*, also known as *Papillaria flexicaulis* (Wilson) A. Jaeger, is known from Asia, Australia, and New Zealand (Noguchi 1976; Norris & Koponen 1985; Streimann 1988); in South America it has been reported from Brazil and Chile (Forzza *et al.* 2010; Robinson 1975; Streimann 1992).

## REMARKS

*Meteorium flexicaule* is herewith reported from Mexico for the first time. The pendent growth form with slender pinnate stems without central strand, and papillae along the walls, at least in some leaf areas, suggested a species of *Cryptopapillaria* M. Menzel. However, the entire leaf margins, rhomboidal cells near the leaf apex, and papillae present over cell lumens and walls, do not seem to fit that generic concept. The leaf margin in *M. flexicaule* has been described as plane, entire to crenulate (Norris & Koponen 1985) while Robinson (1975) indicates that it is plane, minutely crenulate below, entire distally, and Streimann (1988) points out that the leaf margin is never denticulate.

The Mexican material contains slender, irregularly and loosely pinnate stems with short pointed branches (Fig. 1A), a central strand is absent but in section it shows several outer layers of thick-walled cells. Stem and branch leaves (Fig. 1B) are appressed (Fig. 2A); the secondary stem leaves lanceolate from a broad cordate base, 1.2-1.5 mm long with an attenuate apex and the margin entire; costa strong, smooth, reaching  $\frac{2}{3}$  of the leaf length or slightly longer. Branch leaves are similar, but smaller, 0.8-0.9 mm long. Distal and mid-leaf cells are rhomboidal (Figs 1C; 2B, C), slightly longer in the apex, obscure, papillose on lumens and on longitudinal cell walls (Fig. 2B-D); the proximal cells and mid-basal cells are long, smooth or seriate papillose along the longitudinal walls or over lumens (Fig. 2E, F); cells at leaf base toward margins are oblate (Fig. 1D).

### *Aligrimmia peruviana* R.S. Williams

*Bulletin of the New York Botanical Garden* 3 (9): 124 (1903).

**SPECIMEN EXAMINED.** — Mexico. Estado de México, Nevado de Toluca, 19°07'N, 99°45'W, 9.IX.2018, in alpine area, on exposed moist rock, Romero 47 (MEXU).

**DISTRIBUTION.** — *Aligrimmia peruviana* is known from Peru and Argentina. J. C. Solomon collected a specimen in Peru in 1977, and M. J. Cano and M. Alonso obtained two samples in Argentina in 2008, according to records cited in Tropicos.

## REMARKS

*Aligrimmia peruviana* R.S. Williams was described as a new genus and species more than a hundred years ago (Williams 1903). Deguchi (1987) and Murray (1984) described and illustrated its peculiar morphology based on the type specimen which, until recently, was the only herbarium material available for this taxon. In 2018 Jorge Romero, a student searching for moss tardigrades collected a mixed sample containing several stems of *A. peruviana*. This material shows the same gametophytic features as the Peruvian plants but bear no sporophytes. The fleshy ovate-oblong leaves are loosely imbricate when dry, with a sub-cucullate apex, and erect margins partly covering the lamellae; the costa is broad, c. 100  $\mu$ m at base, covered by 3-7 cell high lamellae in the distal half. In transverse section, the lamina is mostly unistratose; the costa has a dorsal stereid band covered by two layers of guide cells

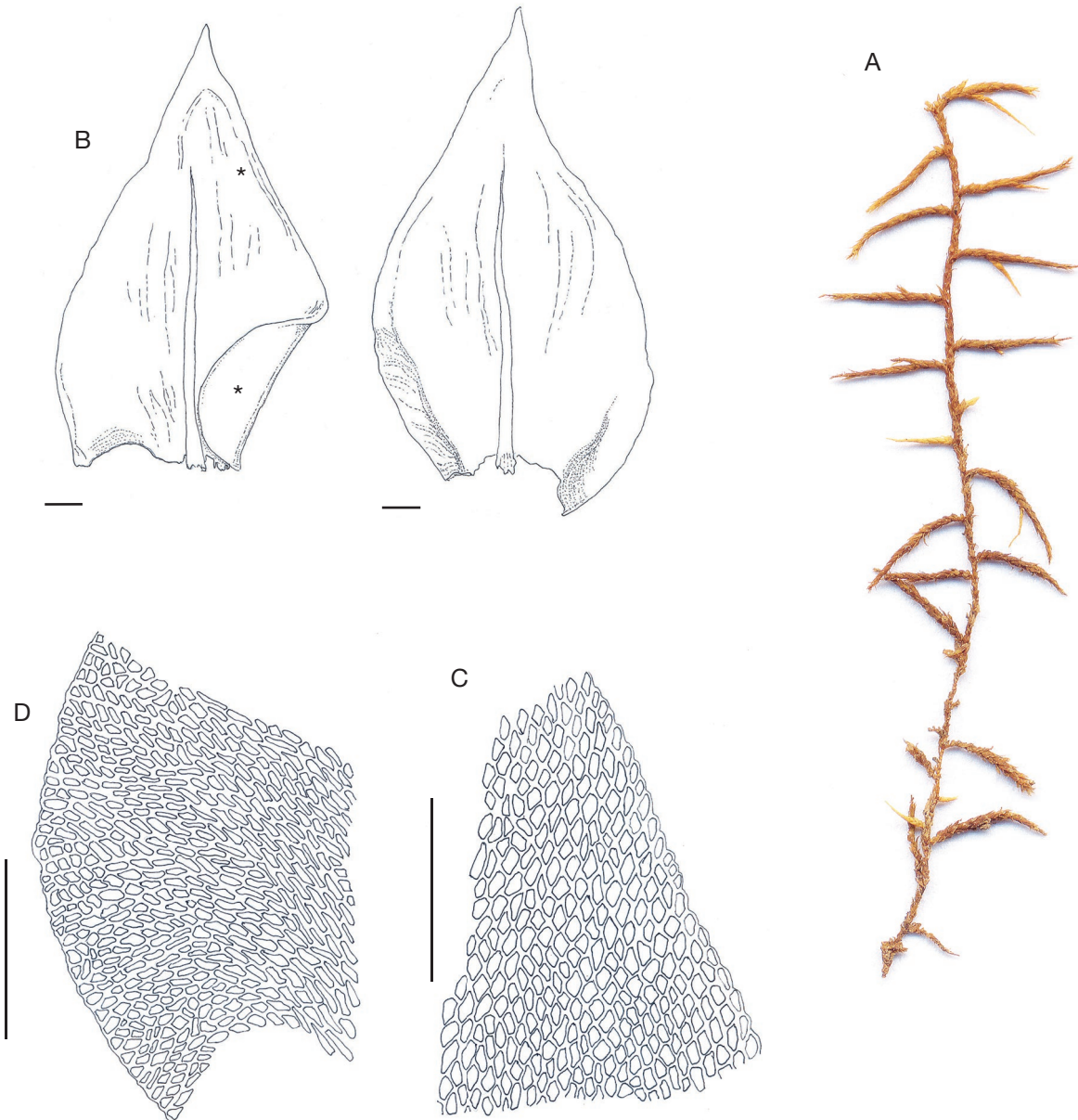


FIG. 1. — *Meteorium flexicaule* Wils. in Hook.: **A**, three-centimeter fragment of a stem. Branches are short and pointed; **B**, stem leaves, asterisks mark position of cells in figures C and D; **C**, subapical and mid-leaf cells; **D**, basal leaf cells. No papillae positions are shown. Scale bars: 0,1 mm.

one of which extends over the lamina and bears lamellae as well. Other features are described and illustrated by Deguchi (1987) and Murray (1984).

## DISCUSSION

Two unusual species are added to the Mexican moss flora. Although from widely different habitats, both have disjunct ranges between South America and Mexico; their origin is unknown, but it is assumed that both have a South American derivation. The alpine habitat of *Algrimia peruviana* may be explained by a high elevation stepping-stone dispersal through the higher elevations of South and

Central America. The obscure growth habitat may be liable for its late discovery in Mexico and in other parts of the continent. While in South America it grows at moderate (2250-2730 m) elevations, in Mexico it was found above the timberline (above 3700 m).

In contrast to the above, the discovery of *Meteorium flexicaule* is puzzling. The plants are conspicuous, comparatively large, and epiphytic. Other cloud forest species are widely represented in this habitat and geographical range, but no other *M. flexicaule* specimens have been found despite frequent fieldwork in much of the cloud forest vegetation in eastern and southern Mexico. Equally puzzling is its range in Asia, southern South America and Mexico. It should be noted, however, that there are more than one hundred species in the

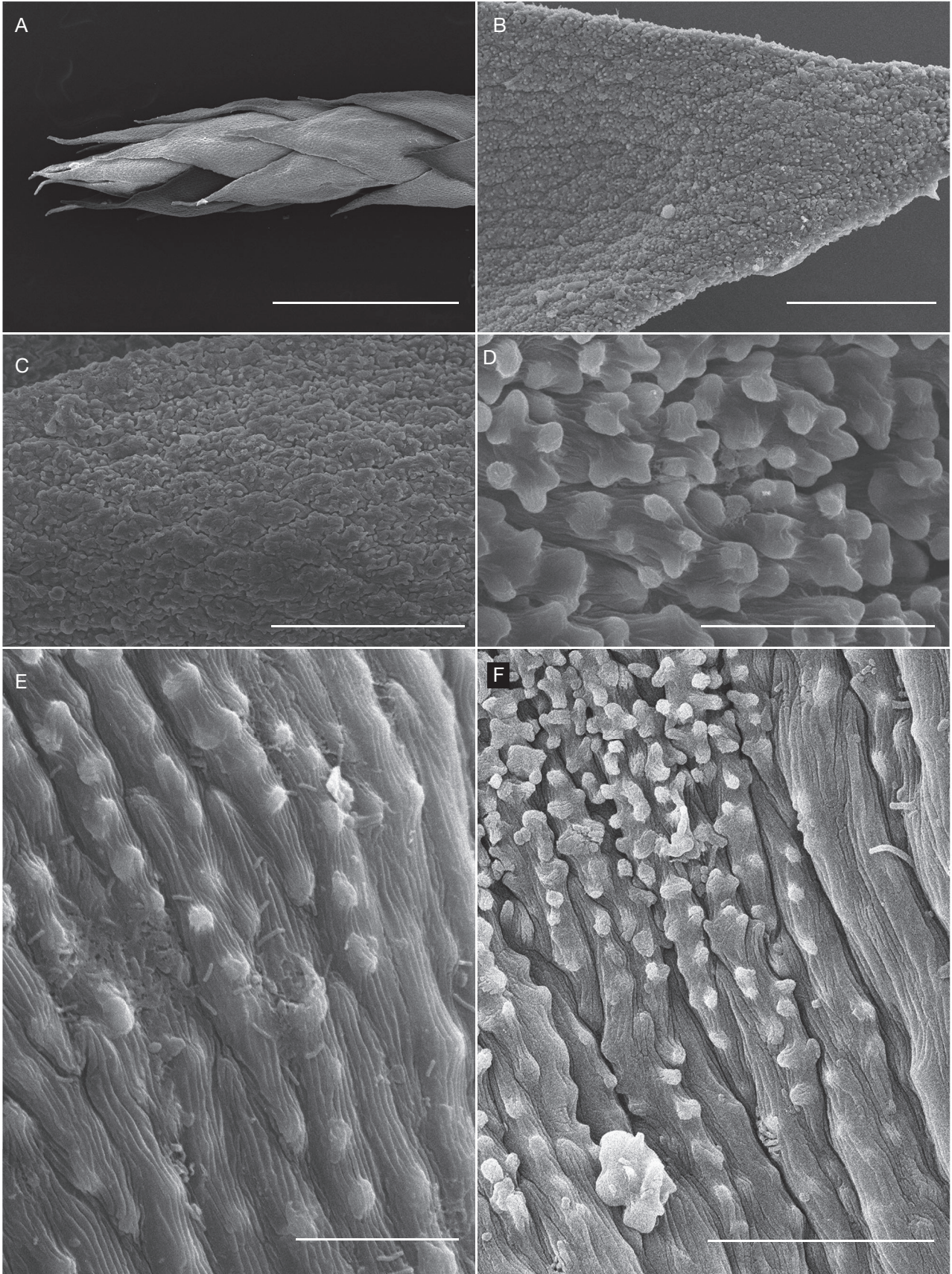


FIG. 2. — *Meteorium flexicaule* Wils. in Hook.: **A**, tip of branch showing leaf orientation; **B**, leaf apex showing rhomboidal papillose cells in adaxial position; **C**, abaxial view showing upper leaf cells distinctly papillose while others seem partly worn off; **D**, mid-leaf cells; **E**, basal leaf cells with central row of papillae over lumen; **F**, mid-leaf basal cells, lowermost cells with papillae in two rows. Scale bars: A, 500  $\mu$ m; B, 50  $\mu$ m; C, 40  $\mu$ m; D, E, 10  $\mu$ m; F, 20  $\mu$ m.

Mexican moss flora that follow similar distribution in Asia and the Pacific whose range has not been properly discussed and explained.

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