

Grimmia serrana (Bryopsida, Grimmiaceae), a new species from California, U.S.A.

JESÚS MUÑOZ¹, JAMES R. SHEVOCK² and DAVID TOREN²

¹Real Jardín Botánico, Madrid, Spain and ²California Academy of Sciences, San Francisco, U.S.A.

SUMMARY

Grimmia serrana, a new endemic species for California, is described and illustrated. The new species is readily distinguished by the presence of multi-stratose marginal bands that are rounded in cross-section. The leaf morphology displayed by *Grimmia serrana* is unique within the genus. The distribution of *Grimmia serrana* is along the western foothills of the Sierra Nevada and in the northern Coast Range.

KEYWORDS: *Grimmia serrana*, Sierra Nevada, California, U.S.A.

INTRODUCTION

The genus *Grimmia* currently consists of 71 species worldwide (Muñoz & Pando, 2000). For that work the first author studied the types of 75 percent of the taxa attributed to *Grimmia* in *Index Muscorum* (Wijk, Margadant & Florschütz, 1962, 1969). More than 10,000 *Grimmia* specimens from major herbaria have been examined to date. A primary objective of this study was to obtain a better understanding of poorly known *Grimmia* taxa and to focus on under-collected regions. These monographic efforts have subsequently placed many *Grimmia* in synonymy with more wide-ranging species, resurrected others (Muñoz, 1999b), and at the same time validated the need to describe a few *Grimmia* species as new to science.

During revisionary work of North American specimens to complete a monograph of the genus similar to previous contributions for Latin America (Muñoz, 1999a), the senior author had the opportunity to study the *Grimmia* holdings at MO. One specimen labelled as *Grimmia montana* Bruch & Schimp. (*MacFadden 3840*), proved to be unlike any other published taxon in the genus. Although it was immediately evident that a new taxon of Grimmiaceae was at hand, J.M. hesitated to describe it as a new *Grimmia* because it was sterile and was very similar in appearance to some members of *Schistidium*. Indeed, the new species is gametophytically closer to *S. cinclidonteum* (Müll. Hal. in Röhl) B. Bremer and *S. occidentale* (E. Lawton) Churchill than to any species of *Grimmia*, although superficially, when placed in *Grimmia*, it would

most likely be misidentified in herbaria as *Grimmia ovalis* (Hedw.) Lindb. The discovery of fertile specimens independently by J.S. and D.T. at other localities in the Sierra Nevada of California eliminated any doubt about the generic affinities of the new taxon, which is hereby described and illustrated.

DESCRIPTION

Grimmia serrana J. Muñoz, J.R. Shevock & D. Toren **sp. nov.** Figs 1–2.

TYPE: U.S.A. California: Tulare Co., Wishon Campground, North Fork of the Middle Fork Tule River, Sequoia National Forest, 36°11'15"N, 118°40'00"W, 1220 m, 18 January 1998, *Shevock & Morosco 16808* (holotype, MA; isotypes, CAS, MO, NY, UC).

Species cum limbidio 2–4(–5)–stratoso, basali intramarginalescens, seta recta, ad 3.5 mm longa, et capsula laevi, exserta.

Dioicous. Plants green to olive-green. Stems erect or ascending, to 3 cm, with central strand. Leaves erect and appressed or slightly flexuous when dry, patent when moist, 2.5–3.5 × 0.6–0.7 mm, lanceolate, acuminate, concave, not plicate; margins plane; costa semi-elliptical, undifferentiated to weakly differentiated from lamina, ventral layer 4–8 cells wide in cross-section; lamina 1–3-stratose in the distal 2/3 with 2–4(5)–stratose intramarginal bands rounded in cross-section and similar to the

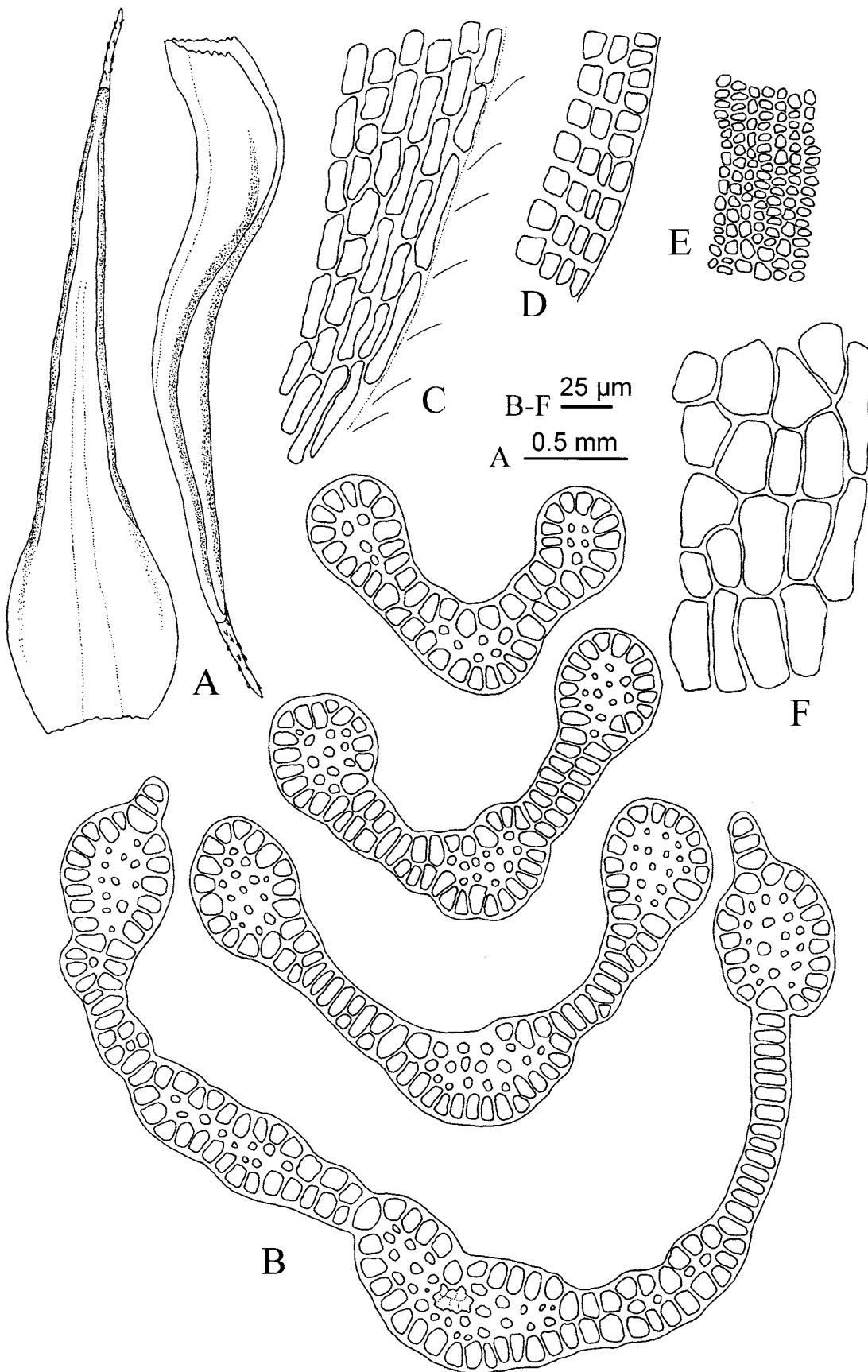


Figure 1. *Grimmia serrana*: A, Leaves; B, Transverse sections from proximal to distal part of leaf; C, Proximal juxtacostal leaf cells; D, Proximal marginal leaf cells; E, Distal leaf cells; F, Medial exothelial cells. A, F from *Shevock & Morosco 16808* (MA, holotype), B–E from *MacFadden 3840* (MO).

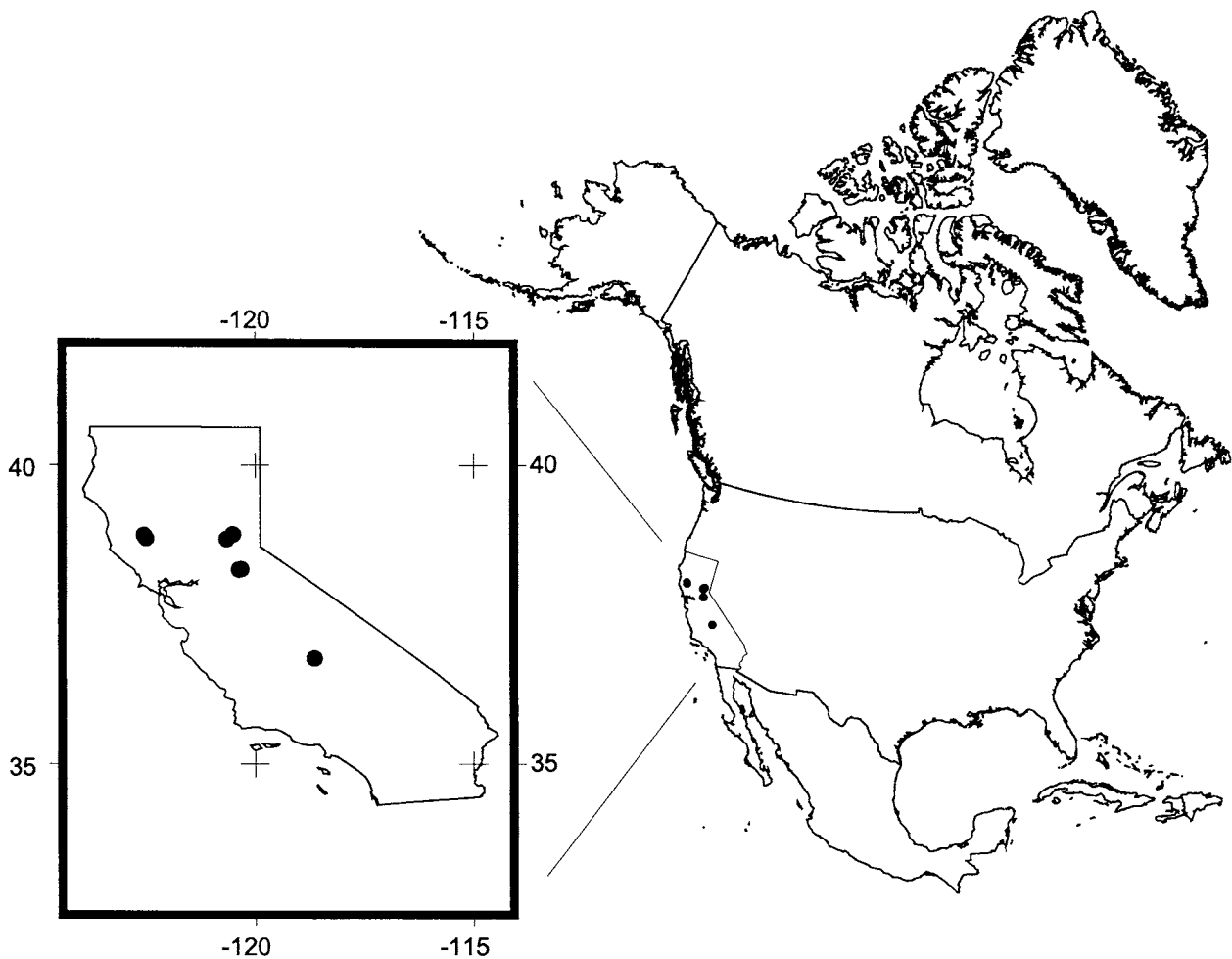


Figure 2. Distribution of *Grimmia serrana* in North America.

costa in structure, occasionally pseudopapillose; *distal cells* 5–10 μm long, oblate to rectangular, not bulging, not papillose, walls sinuous; *proximal juxtacostal cells* 25–60 \times 8–10 μm , rectangular (2–6:1), walls thick and nodulose; *proximal marginal cells* 14–18 \times 6–12 μm , isodiametric to rectangular, occasionally oblate ((0.8)1–2:1), thick and nodulose; *hyaline hair-points* terete, straight, erect, occasionally reflexed when dry, to 1 mm, denticulate to dentate. *Propagula* lacking.

Perichaetial leaves 4.0–4.5 \times 1 mm, convolute, larger than vegetative leaves (2–3 \times). *Androecia* terminal. *Setae* straight to slightly curved, 3.5 mm long. *Capsules* exserted, ovoid, symmetric, smooth, stramineous, lacking stomata; *exothecial cells* 40–75 \times 25–40 μm , oblong (1.0–3.0:1), thin-walled; *annulus* compound and revoluble, composed of 1 to 2 rows of inflated, isodiametric cells (elongata type); *peristome teeth* 90–100 μm wide at the mouth, entire, not perforated, orange, contrasting in colour with the capsule; *operculum* rostellate to rostrate; *calyptra* cucullate; *spores* 12–15 μm in diameter, smooth.

The specific epithet for this new species is derived from the Spanish language ('*serrana*' = inhabiting or born in a '*sierra*'; '*sierra*' = mountain range of limited extension) in

reference to the Sierra Nevada range where the majority of *Grimmia serrana* occurrences are located.

Additional specimens seen (paratypes):

U.S.A. California: Amador Co., off highway 26 north of town of West Point above North Fork Mokelumne River, 38°25'25"N, 120°32'25"W, 670 m, 17 April 2001, *Toren 8669* (CAS, MA, MO, NY, UBC); Calaveras Co., Winton Road about 3.9 miles northeast of town of West Point above Bear Creek, 38°25'45"N, 120°28'30"W, 1065 m, 15 April 2001, *Toren 8668* (CAS, MA, MO, NY, UC); Lake Co., Big Rock north of Deer Valley and east of Elk Mountain, Mendocino National Forest, 39°17'20"N, 122°53'25"W, 1100 m, 25 April 2000, *Toren 8002* (CAS, MA) and 2 April 2001, *Toren & Dearing 8657* (CAS, MA, MO, NY, UC), 5.5 airmiles NE of Upper Lake and 1 mile SW of High Glade Lookout, Mendocino National Forest, 39°12'10"N, 122°49'20"W, 1220 m, 27 April 2001, *Toren 8745* (CAS, MA, MO, UC); Placer Co., Dutch Flat, Fairfield Ranch at Canyon Creek, 39°11'00"N, 120°50'00"W, 945 m, *MacFadden 3840* (MO); highway 20 at eastern end of Bear Valley, 4.4 miles from Interstate 80, Tahoe National Forest, 39°18'18"N, 120°40'40"W, 6

May 2001, 1400 m, *Shevock & Toren 20707* (CAS, MA, NY, UC).

endemic documented for this mountain range (Shevock, 1996).

DISCUSSION

Grimmia serrana is a very distinct species characterized by semi-elliptical costa in cross-section, 2–5(6) stratose marginal bands rounded in cross-section in the leaf limb, becoming intramarginal below the leaf shoulder by producing a unistratose margin (Fig. 1B), and exerted capsules on a long, bent seta. The multi-stratose (intra)marginal bands are a unique feature of this new species within the genus *Grimmia*. Populations occur on granitic, metamorphic or metavolcanic boulders at 670–1400 m. The generalized habitat is within a transition zone of mixed conifer–hardwood forests where either *Calocedrus decurrens* (Torrey) Florin, *Pinus ponderosa* Laws., *Pinus sabiniana* Douglas, *Pseudotsuga menziesii* (Mirbel) Franco, *Quercus kelloggii* Newb. or *Quercus chrysolepis* Liebm. comprise the dominant overstory. Most of the colonies of *Grimmia serrana* grow on sloping rocks subject to runoff rather than on flat or vertical surfaces. Generally two or more other common *Grimmia* species such as *G. laevigata* (Brid.) Brid., *G. lisae* De Not., *G. montana* Bruch & Schimp. or *G. trichophylla* Grev. are frequently associated with occurrences of *G. serrana*.

Grimmia serrana is currently recorded from several localities along the western slope of the Sierra Nevada and two occurrences in the northern Coast Range of California (Fig. 2). The Sierra Nevada, over 640 km long and with an elevational range from 100 to 4418 metres, is rich in *Grimmia* species. Besides this new species, several other novelties and otherwise noteworthy and geographically interesting mosses for the Sierra Nevada have either recently been published (Lewinsky-Haapasaari & Norris, 1998; Shaw, 2000) or are planned for future publication. *Grimmia serrana* is yet another Californian

ACKNOWLEDGEMENTS

We thank Charo Noya (Madrid) for making the final drawings and Lars Hedenäs (Stockholm) for rendering the Latin diagnosis.

TAXONOMIC ADDITIONS AND CHANGES: *Grimmia serrana* J. Muñoz, J.R. Shevock & D. Toren, sp. nov.

REFERENCES

- Lewinsky-Haapasaari J, Norris DH. 1998. *Orthotrichum shevockii* (Orthotrichaceae), a new moss species from the southern Sierra, California. *Bryologist* **101**: 435–438.
- Muñoz J. 1999a. A revision of *Grimmia* (Musci, Grimmiaceae) in the Americas. 1: Latin America. *Annals of the Missouri Botanical Garden* **86**: 118–191.
- Muñoz J. 1999b. *Grimmia arcuatifolia* and *G. leibergii* (Musci, Grimmiaceae), two neglected species from northwestern North America. *Anales del Jardín Botánico de Madrid* **57**: 7–13.
- Muñoz J, Pando F. 2000. A world synopsis of the genus *Grimmia* (Musci, Grimmiaceae). *Monographs in Systematic Botany of the Missouri Botanical Garden* **83**: i–vi, 1–133.
- Shaw AJ. 2000. *Schizymenium shevockii*, a new species of moss from California based on molecular evidence. *Systematic Botany* **25**: 188–196.
- Shevock JR. 1996. *Status of rare and endemic plants*. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, chapter 24, Assessments and scientific basis for management options. Davis: Centers for Water and Wildland Resources, University of California: 691–707.
- Wijk R van der, Margadant WD, Florschütz PA. 1962. Index Muscorum 2. D–Hypno. *Regnum Vegetabile* **26**: 1–535.
- Wijk R van der, Margadant WD, Florschütz PA. 1969. Index Muscorum 5. T–Z, Appendix. *Regnum Vegetabile* **65**: [i]–xii, 1–922.