



## Taxonomic revision of *Riella* subgenus *Trabutiella* (Riellaceae, Sphaerocarpaceae)

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### Abstract

The genus *Riella* (Riellaceae, Sphaerocarpaceae) includes some 24 species of thalloid aquatic liverworts with unique morphological and ecological features among hepatics. These include the development of sporophytes enclosed within involucre and growing submerged in seasonal fresh or brackish water ponds. *Riella* subgenus *Trabutiella* includes species with winged involucre. Seven taxa have been described, however, four to five taxa have been recognized at a time depending on authors. In this study we have conducted a morphological revision of the species of this subgenus, based on 59 traits measured under light and Scanning Electron Microscopy analyses and that were the subject of statistical analyses. Taxonomically most informative traits were derived from female involucre and spores, whereas quantitative vegetative traits were of little relevance to taxonomy. Lectotypes are designated for subgenus *Trabutiella* and section *Plicatae* and for *R. cossoniana*. Our analyses support the recognition of six species, and support *R. paulsenii* as a synonym of *R. cossoniana*. A new species, *R. mediterranea* is described, and *R. cossoniana* var. *echinata* is raised to species rank. An identification key, detailed descriptions of the six accepted taxa, updated distribution maps, and full illustrations of four of the species, including the first for *R. echinata* are provided.

**Key words:** Aquatic liverworts, bryophyte taxonomy, disjunct distribution, Marchantiophyta, spore morphology

### Introduction

*Riella* Montagne (1852: 11) (Marchantiophyta, Sphaerocarpaceae) is one and the most diversified of the two genera of the Riellaceae (Cargill & Milne 2013). It is distributed worldwide except in Antarctica, generally with highly disjunct distributions. *Riella* includes about 24 taxa growing commonly submerged in clean, shallow, fresh or brackish waters of seasonal ponds, streams, and more rarely, on permanent lakes, in arid or semiarid regions. The Mediterranean basin concentrates most of the diversity with about one half of the species growing in the area, especially in northern Africa.

The thallus is composed of an axis and a unistratose, dorsal, flat, undulate or helicoid blade (generally referred to as the thallus wing), making the thallus bilaterally symmetrical in the plane of the wing. The thallus apex is usually falciform or circinate, especially in young individuals. Antheridia develop in single rows along the margin of the wing, in its sinuses or rarely near the axis, whereas archegonia develop along the thallus axis. The sporophyte is enclosed within a sac-like, globose, gametophytic structure (involucre), as characteristic of the Order Sphaerocarpaceae. The spores are variously ornamented with spines, papillae, etc., and provide the most informative set of characters used for the identification of the species.

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