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On the presence of *Riella notarisii* (*Riellaceae*) in the peninsular Italy

Abstract

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First finding of *Riella notarisii* (Mont.) Mont. (*Hepaticae, Riellaceae*) in peninsular Italy; an aquatic liverwort included in the red list of Italian flora. The occurrence in Calabria (South Italy) is reported. Some notes on its ecology, taxonomy and corology are presented.

Key words: *Hepaticae*, Mosses, Flora.

Introduction

The genus *Riella* includes some 24 species of thalloid aquatic liverworts distributed worldwide except in Antarctica. The species represented in Europe and Macaronesia are *R. helicophylla* (Bory & Mont.) Mont., *R. notarisii* (Mont.) Mont., *R. parisii* Gott. ex Gott. & Rabenh. and *R. cossoniana* Trabut (Cirjuano & al. 1988). The only representative of the genus in Italy is *R. notarisii* recorded only in two localities of Sardinia (Pula and Cagliari) and a little population at the Gulf of Gela, Sicily (Privitera & Puglisi 1997). *Riella* is a very old genus probably Paleozoic (Shuster 1992) enclosed in the family *Riellaceae* (Engler 1892) in the order *Spaerocarpales* (Heeg 1891). Molecolar data indicate that represents basal and divergent line of *Marchantiopsida* (Forrest & Crandall-Stotler 2005; He-Nygrén & al. 2006).

Nomenclatural notes

Historical nomenclature and worldwide distribution of the genus *Riella* were treated by many autors (Allorge 1932; Persson & Iman 1960; Mueller 1954; Duell 1983).

Riella notarisii was described by Montagne as *Sphaerocarpus notarisii* (Montagne ex de Notaris, 1838). After transferred by Bory & Montagne (1843, 1844) in the genus *Duriœa* and finally placed in the genus *Riella* (Montagne, 1852) because under the name *Duriœa* there was a similar genus of the family *Umbelliferae* (*nomen conservandum*). So Montagne "*decided on the advice of eminent botanists motivation to finally adopt the name*

Riella, derives from the word Rieu, Italian Rio, stream in our language, to perpetuate, as far as in the memory of beautiful discovered Sir Du Rieu de Maisonneuve, convinced that by doing so I am only fair to him […] *I had met there as my second species R. notarisii, collected in the wet plain of Sardinia by my learned friend Mr. De Notaris, professor of botany at the University of Gen*oa" who had found it for the first time in Sardinia "*in pascuis spongiosis Sardiniae australioris proper Pulam, martio 1835*" (De Notaris 1838). According to Privitera & Puglisi (1997) *Riella battendieri, R. gallica, R. notarisii,* and *R. reuteri* should be considered as ecological forms of the same species.

Ecological remarks

Riella notarisii is a terricolous and hydrophilous species. A stenopoikilohydrous performance is evident in this species (Kappen and & Valladare 1999). It is ephemeral short-lived shuttle species: the gametophyte is intolerant of desiccation and capable of surviving for only a short time after water level subsidence. So the gametophytes developing in seasonal muddy and disappearing shortly after such muddy dry out. The species is capable of completing its entire life cycle in less than 3 months. Growth from spore to mature gametophyte may be accomplished in little over a month (Schuster 1984). The spores are adapted to survive many years of desiccation and still remain viable, e.g., up to 3 years in *R. americana* and 12 years in *R. capensis* (Studhalter 1933). Leaving spores can produce new plants when return next flooding. The species vanishe because the habitat disappears; they are "*adapted to microhabitats that disappear predictably at varying rates but reappear frequently in the same community*" (During 1992).

Climate data are missing for the surveyed area, so we refer at nearest station of Torano Castello characterized by an annual precipitation of 877 mm and an annual mean temperature of ± 16°C, corresponding to a bioclimate of mesomediterranean – subhumid (Biondi & Baldoni 1995). Nevertheless in the valley of studied area there is persistent fog in the early hours of the morning for many days of the year.

Taxonomic remarks on the Calabria specimens

Calabrian specimens of *Riella notarisii* do not differ from the Sicilian population (Fig. 1). However, many samples have a dichotomous thallus, both bring sporophyte.

Distribution

Riella notarisii is a species with a fragmented and punctiform distribution in Mediterranean basin with an outpot in Switzerland (lac Leman). The species was discovered by Reuters (Bernet 1888; Meylan 1924) in November 1851 in the wet mud on the banks of Lake Geneva, at the mouth of the Versoix. It has long since disappeared (Jelenc 1957).

In the Iberian peninsula it is known from Monegros and from the island of Menorca (Gómez & al. 1983).

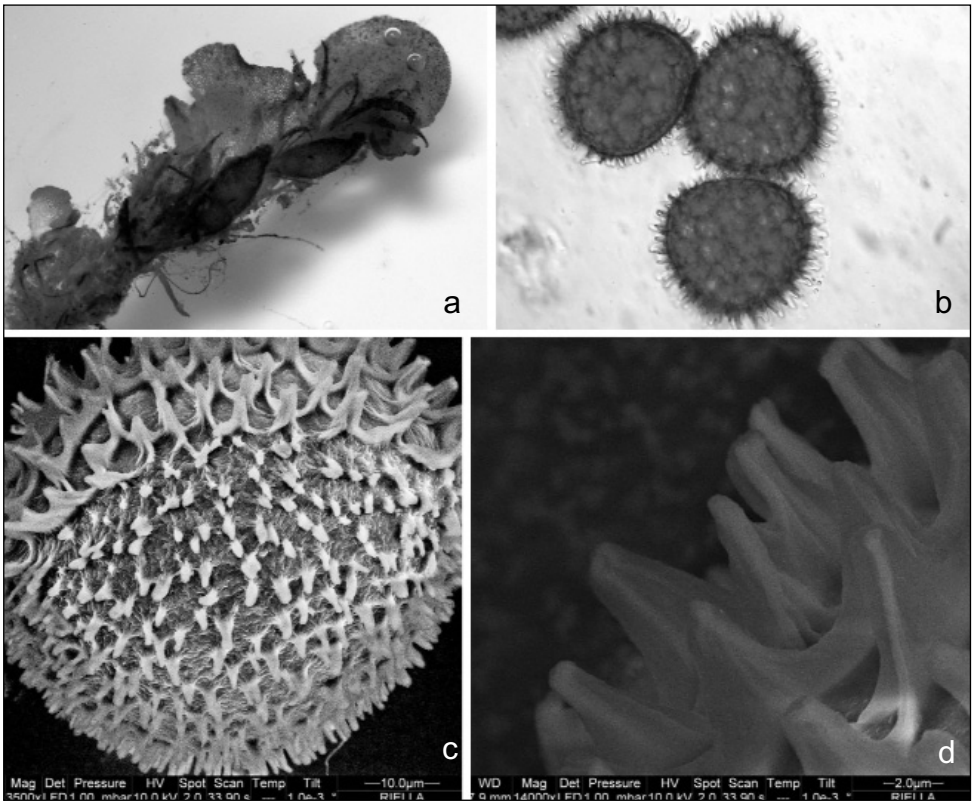

Fig. 1. **a.** *Habitus* (6 × magnification); **b.** spores (800 × magnification) to right at biological microscope; **c.** Proximal face (below) and distal face of the spore (above); **d.** spinules of the spores at Scanning Electron Microscop (SEM) of *Riella notarisii.*

It is known in Spain from Alicante, Cuenca, Huelva, Madrid, Sevilla, Valencia, Zaragoza and Balearic islands, in Portugal from Algarve (Valentin & al. 2007).

In France it was recorded from some localities of the department of Hérault, such as Roquehaute and to *mare de Rigaud* (sub *Riella battandieri* Trab. fo. *gallica* (Bal.) Corbière = *Riella gallica* Bal.).

It is known also to Croatia, Tunisia, Morocco, Greece, Crete and Canary islands (Ros & al. 2007).

In Italy *Riella notarisii* was known only for Sardinia: Pula and Cagliari (Bischler & Jovet-Ast 1971-72), where it was considered vanished (Aleffi & Schumacker 1995). A new Italian station was found in Sicily (Privitera & Puglisi 1997). Recently, to this species the IUCN category "Critically endangered" was attributed (Privitera & Puglisi 2008) and at present it is included in the Italian red list (Rossi & al. 2013). According to Privitera & Puglisi (1997) *Riella notarisii* is a strictly Mediterranean species.

The station

Riella notarisii was found growing in a pure population on muddy-clay soil in marshes winter-flooded by water in Tarsia lake (Cosenza, South Italy) at 51 m. a.s.l. The collected specimens are deposited in the Herbarium of Museo di Storia Naturale della Calabria ed Orto Botanico, Università della Calabria: CLU nr. 4086, 4087, 4088, 4089 leg. D. Puntillo 17-02-2014 (UTM 39° 36' 41,78'' N – 16° 17' 00,93'' E). The area falls within the nature reserve of Tarsia Lake. In the new station it is very abundant on muddy soil and covers vast areas vacated by winter flooding. Sometimes it grows in a mosaic of ephemeral and other short-lived shuttle bryophytes as *Sphaerocarpos michelii* Bellardi, *Riccia glauca* L., *Physcomitrium pyriforme* (Hedw.) Bruch & Shimp. and *Physcomitrella patens* (Hedw.) Bruch & Shimp. *Riella notarisii* occurs in clearings ascribable vegetation referred to the phytosociological c1ass *Rielletea helicophylla* and at the association of *Rielletum notarisii* (Cirujano & al. 1993). The species is new to peninsular Italy.

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