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# Gymnomitrium crenulatum Gott. in the Iberian peninsula. An ecological and biogeographical study

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## RÉSUMÉ

REINOSO, J., J. RODRIGUEZ & R. SCHUMACKER (1990). *Gymnomitrium crenulatum* Gott. dans la péninsule Ibérique. Etude écologique et biogéographique. *Candollea* 45: 519-523. En anglais, résumés français et anglais.

Connu précédemment d'une seule localité en Espagne, *Gymnomitrium crenulatum* Gott., rare hépatique euatlantique endémique d'Europe, a été découvert récemment dans le nord de la Galice. Des données écologiques et phytosociologiques relatives au groupement qu'il caractérise sont précisées.

## ABSTRACT

REINOSO, J., J. RODRIGUEZ & R. SCHUMACKER (1990). *Gymnomitrium crenulatum* Gott. in the Iberian peninsula. An ecological and biogeographical study. *Candollea* 45: 519-523. In English, French and English abstracts.

Previously known from a single locality in Spain, *Gymnomitrium crenulatum* Gott., a rare euatlantic species endemic to Europe, has been found in N-Galicia. Ecological and phytosociological data relative to the community characterized by this species are precised.

## Introduction

*Gymnomitrium crenulatum* Gott.,<sup>1</sup> a rare euatlantic liverwort, endemic to Europe (GROLLE, 1966; SCHUSTER, 1974) has been found recently in Northern Galicia (Prov. Lugo) on dry exposed granitic boulders colonized by xerophilous bryolichenic communities. As in most of the other European localities (LECOINTE & al., 1982), it was sterile.

Owing to the rarity of this xerophytic aerohygrophilic species on the European continent and its extreme abundance in this new locality, we want to emphasize this second find, almost sixty years after its discovery in Spain by Buch.

## Distribution

### *In Europe*

A distribution map of *G. crenulatum* in Europe has been published by LECOINTE & al. (1982, fig. 1), using the simplified 50 × 50 km UTM-grid adopted by the W.G.M.B.E (SCHUMACKER,

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<sup>1</sup>Nomenclature following GROLLE (1983) for liverworts and CORLEY & al. (1982) for mosses.

1980). This map shows clearly how much the species is frequent in the northwestern part of the British Isles and, on the contrary, scattered and rare on the atlantic coasts of SW-Norway (2 localities), N-Brittany (1 loc.) and NW-Iberian peninsula.

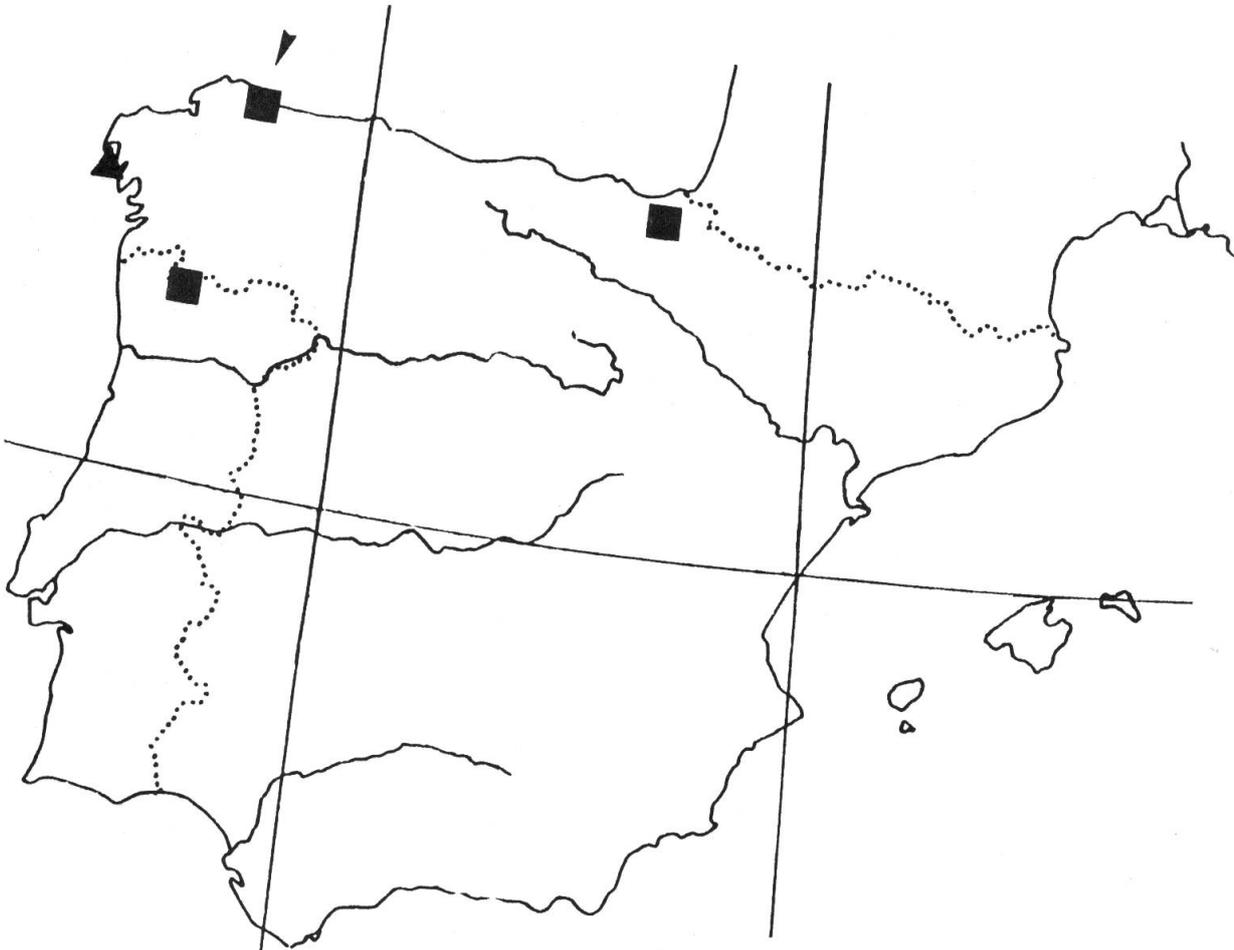


Fig. 1. — Distribution of *Gymnomitrium crenulatum* Gott. in the Iberian peninsula. Each dot indicates the occurrence of the species within a 50 × 50 km square of the UTM-grid.  
Records before 1950 = ▲. Records since 1950: ■. New locality in Galicia, arrow.

*In the Iberian peninsula (fig. 1)*

*Note.* — The localizations are given following the 10 × 10 km UTM-grid (UTM/...) and the simplified 50 × 50 km UTM-grid (FE/...).

*Gymnomitrium crenulatum* was collected for the first time in the Iberian peninsula by H. Buch in 1930 (BUCH, 1934), in Western Galicia.

Hs. prov. La Coruña, Monte Pindo near Corcubión, alt. ca. 500 m, on humid rocks with *Andraea* sp., UTM/MH94, FE/MH4.

Some years later, it was also discovered in Northern Portugal, in different but very closed localities of the Serra do Gerês (TAVARES & TAVARES, 1948, 1950; TAVARES, 1952), on humid granitic rocks, between 450 and 800 m in altitude.

Lu., prov. Minho, Serra do Gerês: Cha de Fonte, UTM/NG72, FE/NG4; entre Cha de Fonte e a Borrageira, UTM/NG72, FE/NG4; Pedra Bela, alt. 800 m, UTM/NG71, FE/NG4; Vacaria, alt. 450 m, UTM/NG72, FE/NG4; Curral do Vidoal, UTM/NG72, FE/NG4; Junceda, UTM/NG62, FE/NG4.

New collections were also made in this massive on exposed granitic rocks by Schumacker and Sérgio in 1984 (unpublished data).

Lu., prov. Minho, Serra do Gerês: Rio Homen, alt. 850 m, leg. R. S. 840617/49 (LGHF, LISU) UTM/NG72, FE/NG4; Cascato do Arado, alt. 750 m, leg. R. S. 840619/13 (LGHF, LISU), UTM/NG71, FE/NG4.

During a common bryological trip through Galicia in March 1987, one of us (R. S.) discovered this species in the southern part of the Serra de Toxiza, close to Estelo (Mondoñedo, prov. Lugo), south to the Pedrido river, on many big hercynic granitic boulders.

Hs., prov. Lugo, Estelo, alt. 490 m, leg. R. S. 870309/2 (LGHF); UTMPJ20, FE/PJ2.

A third Spanish locality has also been discovered recently on moist granitic rocks in the Basque country (INFANTE & HERAS, 1989) and must be added to the present distribution.

Hs., prov. Guipuzcoa, Oyarzun, Peñas de Aya, alt. 700 m, leg. Heras, 1986 (BCB27162, teste R. S. 1.1989, soc. *G. obtusum*), UT(M/WN99, FE/WN3).

Owing to its very special habitus — looking better like a crustaceous lichen than a liverwort — *Gymnomitrium crenulatum* is probably easily overlooked by those bryologists who never have seen it once, at least in herbarium.

The recent collections in N-Galicia and Basque country let expect other discoveries in the humid colline belt along the northern coast of Spain on suitable granitic substrates.

### Geography and climate at Estelo

Estelo is situated on an old terrace of the deeply embanked Pedrido river, at the extreme south of the serra de Toxiza, at 490 m in altitude. The substrate consists of late hercynic heterogranular granite with calco-alkaline tendency (main components: quartz, potassic feldspath, plagioclase and biotite).

According to CARBALLEIRA & al. (1983), the climatological data from A Fraga Vella, the nearest meteorological station to Estelo, indicates:

- an average yearly temperature of 10.2°C,
- an average maximum temperature of 19.7°C for the hottest month (July),
- an average minimum temperature of 1.5°C for the coldest month (February).

This means that the area has a regular, mild thermic profile due to the oceanic influence (the nearest point on the coast is only at 20 km to the northeast).

The average annual rainfall reaches 1799 mm with a maximum at the end of autumn and in winter. There is a marked drop in rainfall during the summer, but without a period of drought sensu Gaussen. During the summer, the zone is subject to frequent oceanic breezes which, when they collide with the mountain barriers, originate clouds and rainfall. Thus, the relative air humidity is often very high.

From the bioclimatic and chorological point of view, following RIVAS-MARTINEZ (1987), the locality belongs to the "colino superior horizon" (colline belt) of the Galaico-Asturian sector (septentrional subsector) within the Cantabroatlantic province (Eurosiberian region).

The climatic series corresponds to the *Blechno spicanti-Querceto roboris* sismetum; the substitution stage of heather with *Erica mackaiana* (*Gentiano pneumonathe-Ericetum mackaiana*) is very frequent in the area due to agropastoral uses.

### Ecology and phytosociology of the community with *G. crenulatum*

The ecological characteristics observed at Estelo differ perceptibly from those indicated for Brittany (LECOINTE & al., 1982). In this region, *Gymnomitrium crenulatum* is found on the lateral faces of big granite boulders accumulated over the river, but always very close (1-3 m) to the water level.

At Estelo, *G. crenulatum* colonizes granite boulders near to the river (up to 50 m away), but never on the blocks close to the river banks, where only hygrophilic bryophytes are to be found.

N° of relevé.	Estelo					Gerês		Brittany
	1	2	3	4	5	6	7	8
Exposure .....	N	NW	W	NW	NW	NW	—	NE-NW
Slope (%).....	90	80	80	100	90	90	—	—
Cover (%) .....	70	60	30	60	50	—	—	—
Surface (dm <sup>2</sup> ) .....	4	10	6	1.2	15	—	—	—
Number of species .....	4	4	8	9	7	—	—	—
<i>Gymnomitrium crenulatum</i> .....	4.5	3.5	1.2	+2	3.3	*	*	V
<i>Andreaea rothii</i> .....	+2	r	+2	.	1.2	*	*	.
<i>Cladonia</i> sp. ....	.	+	r	2.3	.	*	*	V
<i>Diplophyllum albicans</i> .....	.	.	r	1.2	r	.	.	V
<i>Campylopus pilifer</i> .....	.	.	r	+2	+2	*	.	.
<i>Scapania compacta</i> .....	.	.	1.2	.	.	.	.	V
<i>Porpidia</i> sp. ....	.	+2	1.2	.	.	.	.	V
<i>Stereocaulon evolutum</i> .....	.	.	2.3	.	.	*	.	III
<i>Racomitrium lanuginosum</i> .....	.	.	.	.	+	.	.	V
<i>Cladonia subcervicornis</i> .....	.	.	.	.	+2	.	.	I
<i>Marsupella emarginata</i> .....	1.2	.	.	.	.	*	*	.
<i>Mycarea</i> sp. ....	+2	.	.	.	.	.	.	.
<i>Frullania tamarisci</i> .....	.	.	.	3.4	.	.	.	.
<i>Lepraria</i> sp. ....	.	.	.	1.2	.	.	.	.
<i>Cephaloziella</i> sp. ....	.	.	.	r	.	.	.	.
<i>Racomitrium heterostichum</i> .....	.	.	r	.	.	*	.	.
<i>Polytrichum piliferum</i> .....	.	.	.	.	+	.	.	.
<i>Cephaloziella stellulifera</i> .....	.	.	.	.	.	.	.	I
<i>Gymnomitrium obtusum</i> .....	.	.	.	.	.	*	.	.

Table 1. — Community of *Gymnomitrium crenulatum* Gott. in NW-Spain, N-Portugal and W-France.

Relevés 1-5: Estelo (Lugo, Spain), J. Reinoso & J. Rodriguez 1989; 6-7: Portugal, Serra do Gerês, R. Schumacker & C. Sérgio, 1984; 8: France, Brittany, Lecoince & al. (1982, table 1, 5 rel.).

Possibly, the higher rainfall, the high humidity and the frequency of low clouds, mainly in summer, explain that here *G. crenulatum* is independent of the direct microclimatic influence of the river, unlike the situation observed in Brittany.

In this new locality, *G. crenulatum* presents also a strict saxicolous behaviour, growing directly on the unaltered rock in small dense appressed patches of a reddish-black or reddish-brown color.

It colonizes the lateral parts of the boulders that are not too open to the sun (NW, N or NE exposure mostly), at all levels (except at the base owing to the heather vegetation) on faces with 60-100% slope.

In Table 1, the relevés of five representatives of the community observed at Estelo (col. 1-5) are given together with two presence lists from the Serra do Gerês in Portugal (col. 6-7) and the synthetic relevé (col. 8) corresponding to Table 1 of LECOINTE & al (1982) from Brittany.

The typical community (rel. 1-2) is poor in species, sometimes monospecific. Most of the species are xerophytic and aerohydrophilic, as shown by their morphological adaptation. *G. crenulatum* has very small creeping stems, with densely appressed minute leaves whose crenulate margins with thickened glossy cells are devoid of chlorophyll.

One of the most significant differences between the three sets of relevés is the frequent presence of *Andreaea rothii* and *Campylopus pilifer* in the iberian community. In France, the first species is normally found in higher position on the rocks (more light and less humidity) above the community of *G. crenulatum* and the second one is absent.

Another difference is that *Scapania compacta*, *Diplophyllum albicans* and *Racomitrium lanuginosum* are faithful species of the community in Brittany. In Galicia (rel. 3 and 4) the first

two taxa have only been observed in more humid and normally in lower and more humid and normally in lower and more shaded parts of the rocks, where a perceptible layer of soil exists, in a transition zone towards another community with almost absolute dominance of both species.

As the thin layer of soil increases, the *G. crenulatum* community is invaded by *Campylopus pilifer*, *Racomitrium lanuginosum*, *Racomitrium heterostichum* and *Polytrichum piliferum* (rel. 5 corresponds to the beginning of the transition).

On the parts of the boulders receiving very little light and where water containing mineral elements drips, the presence of *Frullania tamarisci* is frequently observed (rel. 4).

Interestingly, the Basque country as in Portugal, *G. obtusum* — another xerophytic aerohygrophilic species — was found together with *G. crenulatum*.

One can also notes the frequent occurrence of *Stereocaulon evolutum* in this community.

A summary of the scarce data existing on the ecology of *Gymnomitrium crenulatum* was made by LECOINTE & al. (1982) who publish for the first time a phytosociological study of the community. Von HÜBSCHMANN (1986) does not mention communities of this taxon in Europe.

Considering the poor information available on one hand, and the fact that the center of distribution of *G. crenulatum* is in the British Isles, on the other hand, it does not seem us advisable to fix the syntaxonomic status of these communities described from France and Spain, although we think they are well characterized from the floristical, ecological and chrological point of view.

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