

***Fossombronia caespitiformis* De Not. ex Rabenh. subsp.  
*multispira* (Schiffn.) J.R. Bray et Cargill in Belgium,  
a remarkable extension of its European range**

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**Abstract** – *Fossombronia caespitiformis* subsp. *multispira* has been found at Gozée (province of Hainaut, Belgium), 330 km outside its known range. This subspecies is characterised by elaters having 3-4 spirals. The plants from Gozée correspond well with the original description of *Fossombronia husnotii*, a synonym of this subspecies. As the rhizoids are purple, not colourless as those traditionally described for *F. husnotii*, rhizoid colour is not a reliable character to distinguish *F. caespitiformis* subsp. *multispira*.

**Résumé** – *Fossombronia caespitiformis* subsp. *multispira* a été découvert à Gozée (province de Hainaut, Belgique), 330 km en dehors de son aire connue. Cette sous-espèce est caractérisée par des élatères à 3-4 spires. La morphologie du matériel belge correspond bien à la description originale du *F. husnotii* décrit par Corbière en 1904, un synonyme de cette sous-espèce. Comme les rhizoïdes sont pourpres, non hyalins comme ceux habituellement décrits pour *F. husnotii*, la couleur des rhizoïdes n'est pas un caractère fiable pour distinguer *F. caespitiformis* subsp. *multispira*.

**Fossombroniaceae / *Fossombronia caespitiformis* / *Fossombronia husnotii* / rhizoid colour / Belgium**

## INTRODUCTION

In the recent checklist of Belgian bryophytes (Sotiaux *et al.*, 2007) several species have been added to the list. This was mainly due to intensive prospecting in Southern Belgium. Two species considered extinct were rediscovered, *Philonotis marchica* (Hedw.) Brid. and *Pterygoneurum lamellatum* (Lindb.) Jur.,

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both not seen for nearly a century. One of the species that still remained on the 'hit list' was *Fossombronia caespitiformis* De Not. ex Rabenh., found once in 1903 between Lives and Bossimé (Prov. Namur) in the Belgian district of the Meuse (Mansion, 1905). This find has been much debated. Düll (1983) listed this species for Belgium and indicated that he had seen material. However, the only specimen is (now) sterile and even lacks perianths. De Zuttere & Schumacker (1984) did therefore not accept the presence of this submediterranean species in their checklist and it remained absent from the subsequent checklists and in the flora of Siebel & During (2006). Nevertheless Schumacker & Vaña (2005) follow Düll (1983) and list *F. caespitiformis* for Be, the abbreviation for the geographical territories of both Belgium and the Grand Duchy of Luxembourg.

When in June 2008 A.S. studied a *Fossombronia* specimen he just had collected, with O.S. & H.P. on the side of a ditch between a wheat field and a forest near Gozée (Prov. Hainaut, Belgium), he found the characteristic spores of *F. caespitiformis*. However, spore diameter of the recent collection (32-35 µm) was much lower than that of typical *F. caespitiformis*. We decided therefore to study the specimen in more detail.

## MORPHOLOGY AND ECOLOGY OF THE BELGIAN SPECIMEN

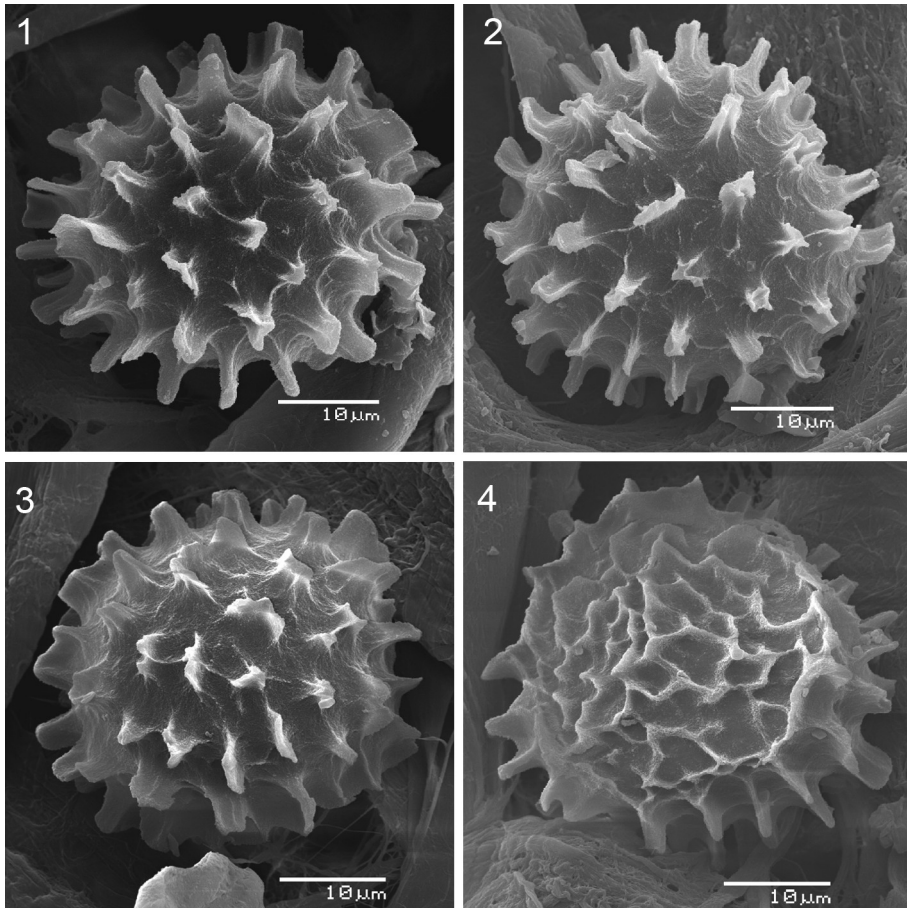
Gametophyte resembling *F. pusilla* (L.) Nees, rhizoids violet. Spores well developed, (30.3) 32-35 (37.4) µm in diameter, distally densely covered with 4-6 µm long truncate, flattened spines, broadened at the base to form a star like pattern, some spines confluent at their base but not forming short lamellae pattern (Figs 1-3); spores proximally without a clear triradiate mark, covered with low, irregular alveolae (Fig. 4). Elaters with 3 (4) spirals, exceptionally bispiralled.

Belgium, province of Hainaut, Gozée, 50°19'37"N 4°21'11"E; IFBL/ H4.25.23, UTM/ ER9676, alt. 185 m, 26-06-2008, leg A. Sotiaux n° 36.552 (herb. Sotiaux)

Gozée is situated in the Mosan district, a loam plateau often overlying calcareous deposits that are exposed in deep valleys. The locality near the artificial lake of the Grand Vivier forms part of the pure loam plateau devoted largely to agriculture. The north side of the drain where *F. caespitiformis* was found had a varied flora. Next to the *Fossombronia* plants grew large colonies of *Phaeoceros carolinianus* (Michx.) Prosk. with *Riccia glauca* L., *Amblystegium serpens* (Hedw.) Schimp., *Barbula unguiculata* Hedw., *Bryum violaceum* Crundw. et Nyholm, *Dicranella schreberiana* (Hedw.) Dixon, *D. staphylina* H. Whitehouse, *Phascum cuspidatum* Hedw., *Physcomitrium pyriforme* (Hedw.) Bruch et Schimp., *Pohlia melanodon* (Brid.) A.J. Shaw and *Tortula truncata* (Hedw.) Mitt.

## DISCUSSION

*Fossombronia caespitiformis* is a very variable taxon. Stotler *et al.* (2003) distinguish two subspecies: *F. caespitiformis* subsp. *caespitiformis* and *F. caespitiformis* subsp. *multispira* (Schiffn.) J.R. Bray et D.C. Cargill. The only diagnostic character given for *F. caespitiformis* subsp. *multispira* is that the elaters



Figs 1-4. *Fossombronia caespitiformis* subsp. *multispira*, SEM-micrographs of spores (from *Sotiaux* 36552). **1-3.** Distal view. **4.** Proximal view.

are consistently 3-5 spiralled, rarely bispiralled, whereas in subsp. *caespitiformis* they are consistently bispiralled, rarely trispiralled centrally. They also reduce *F. husnotii* Corb. to synonymy of *F. caespitiformis* subsp. *multispira*.

Corbière (1889) distinguished his *F. husnotii* from *F. caespitiformis* on spore characters (spores with lamellae elevated at the intersection of the vague and incomplete alveolae; creating a star like pattern on the surface) and on the 3-4 spiralled elaters. He did not mention rhizoid colour. He eventually reduced *F. husnotii* to *F. caespitiformis* var. *husnotii* (Corb.) Corb. because of the many overlaps in the spore characters of both taxa (Corbière, 1904).

Spore diameter is much lower than the figures for *F. caespitiformis* spores given in Paton (1999) and Schumacker & Vána (2005): 38-56(64) µm, rarely 30-40 µm, resp. 42-65 µm, especially since Paton (1999) states that the small spored form has spines and tubercles largely reduced to conical papilla. The spore diameter of *F. husnotii* given in Corbière (1889) is only ca. 40 µm compared to 45-50 µm for *F. caespitiformis*. Also, in his original description of *F. caespitiformis*

var. *multispira* Schiffner (1918<sup>1</sup>) indicates that the spores are smaller than those of the type variety “*Differt a typo sporis minoribus, ...*”.

The 3(4)-spiralled elaters, and the smaller spore diameter of the Belgian collection compared to typical *F. caespitiformis* var. *caespitiformis* makes us confident that this is *F. caespitiformis* subsp. *multispira*. Also, spore ornamentation of this collection matches very well the description and plate of its synonym *F. husnotii* (Corbière, 1889).

Since Müller (1909), European authors (e.g. Paton, 1999) have stressed the colourless or pale brown rhizoids and the variable spores of *F. husnotii* with irregular truncate papillae, sometimes united to irregular lamellae or irregular alveolae on the distal face. Thus, Schumacker & Vána (2005) who follow the nomenclature of Stotler *et al.* (2003) and Stotler & Crandall-Stotler (2007), still key out *F. caespitiformis* subsp. *multispira* on the colourless to pale brown rhizoids and variable spore ornamentation and do not mention the number of spirals in the elaters.

Stotler *et al.* (2003) and Stotler & Crandall-Stotler (2007), however, do not mention rhizoid colour, only the number of spirals in the elaters. As our find shows, rhizoid colour is not a reliable character to distinguish *F. caespitiformis* var. *multispira*. In fact, the rhizoids of two Dutch *Fossombronia wondraczekii* collections were consistently brown to colourless (During in Gradstein & van Melick, 1996). *Fossombronia* taxa with variable rhizoid pigmentation between populations and even on individual plants have been described from Australia (e.g. *F. scrobiculata* G.A.M.Scott & D.C.Pike and *F. vermiculata* G.A.M.Scott & D.C.Pike; Scott & Pike, 1984) and from South Africa (*F. cederbergensis* Perold; Perold, 1998).

The habitat at Gozée is rather nondescript and typical of intensive arable fields. Mansion (1905) found *F. caespitiformis* in a calcareous field in Bossime, between Live and Erpent, 4 km SE of Namur, Prov of Namur, in the Mosan district, in the company of *Fossombronia pusilla*, *Riccia glauca*, *Anthoceros agrestis* Paton and *Phaeoceros laevis* (L.) Prosk. It is therefore difficult to understand why *F. caespitiformis* s.l. is so rare. Hill *et al.* (1991) also can not easily explain the scarcity of this species in England in terms of its habitat requirements, but think this may reflect that it is at its climatic limit.

Mansion (1905) wrote that his specimens were abundantly fertile; the specimen at BR is sterile. Until another fertile specimen is found, this recent find definitely documents *F. caespitiformis* s.l. for Belgium but makes the find of Mansion more plausible.

Both subspecies of *F. caespitiformis* are present in nearly all the Mediterranean countries (Ros *et al.*, 2007) and in Madeira and the Canaries. Along the Atlantic coast it is rare from Portugal to France up to the English Channel and in Southern England (Hill *et al.*, 1991). *Fossombronia caespitiformis* subsp. *caespitiformis* is also present in Australia (McCarthy, 2006). The nearest localities to Gozée are in Normandy (Villons-les-Buissons, at 365 km; Lecointe, 1978) and in Southern England (at ca. 330 km; Hill *et al.*, 1991). Because of the large overlap in distribution of the two subspecies of *F. caespitiformis* these could also be treated as varieties, *F. caespitiformis* var. *husnotii* then has priority.

1. The publication date of *Fossombronia caespitiformis* var. *multispira* is not 1917 as indicated by Stotler *et al.* (2003) but 1918. See page 113 of *Oesterreichische Botanische Zeitschrift* 67.

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