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Tayloria splachnoides (Schleich. *ex* Schwägr.) Hook., new to the Pyrenees (France)

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Résumé – *Tayloria splachnoides* (Schleich. *ex* Schwägr.) Hook. est signalé pour la première fois dans la chaîne des Pyrénées sur la base de trois récoltes effectuées en 2007 dans le périmètre de la Réserve Naturelle de Mantet (Pyrénées-Orientales, France).

Summary – *Tayloria splachnoides* (Schleich. *ex* Schwägr.) Hook. is recorded for the first time in the Pyrenees from three gatherings made in 2007 in the Natural Reserve of Mantet (Pyrénées-Orientales, France).

***Tayloria splachnoides* / *Splachnaceae* / Pyrenees / ecology / Mantet**

INTRODUCTION

In the course of a bryological survey of the Natural Reserve of Mantet (Pyrénées-Orientales, France), several populations of *Tayloria splachnoides* (Schleich. *ex* Schwägr.) Hook., a species not formerly recorded in any part of the Pyrenees, were found. *Tayloria splachnoides* is one of the eight members of genus *Tayloria* in Europe (Hill *et al*., 2006), almost all of which are listed in the Red Data Book of European Bryophytes (ECCB, 1995)

The worldwide distribution of *Tayloria splachnoides* was reviewed by Szmajda *et al*. (*in* Ochyra & Szmajda, 1991). From the detailed analysis provided in this work, this species exhibits "a very wide but strongly discontinuous arctic-alpine range in the Holarctic" and recurs in "Central America". In Europe the species is bicentric, occurring in the northern parts of the continent and in the Central European mountains, where it is mainly alpine.

The species has been considered doubtful for France (Düll, 1985, 1992). Brotherus *in* Engler (1924) mentioned the occurrence of *Tayloria splachnoides* in the Pyrenees but later Crum (1955) stated that he was "inclined to doubt Brotherus' statement in regard to the Pyrenees". This report could originate in the misleading synonym *Dissodon splachnoides* Grev. *et* Arn. = *Tayloria acuminata*, a species that was considered to be present in the Pyrenees in Augier (1966) but not in the synthesis of Szmajda *et al.* (*in* Ochyra & Szmajda, 1991).

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In fact, most of literature records should be considered with caution as they are not substantiated by any herbarium specimen and because their authors obviously failed to distinguish *Tayloria splachnoides* and *T. acuminata* ("*T. splachnoides* var. *obtusa* B.S.G."). Debat (1886), Meyran (1914), Husnot (1892-1894), Boulay (1872, 1884) and Guillaumot (1935) mentioned several localities: région de Peisey, forêts des Esserts, Mont Cenis, haut Jura, Montendre, Le Bouchet, Tête Noire, Mont-Blanc, vallée de Chamonix à la Tête Rouge. Later, Guillaumot (1949) nevertheless clearly distinguished between *Tayloria splachnoides* and *T. acuminata* (the latter less robust and with propagula according to this author). *Tayloria splachnoides* is cited in Rosuel-Peisey in that publication, a record that is confirmed by the herbarium sheets PC0094380 and PC0094379.

Based on the finds here reported, this paper intends to highlight the presence of this species in the Pyrenees, and its distribution in France and Western Europe.

STUDY AREA

The Natural Reserve of Mantet has a transition climate, with characteristics of Mediterranean and mountainous environments. Oceanic precipitations are as important as the Mediterranean ones and convective rains are abundant due to the mountainous character of the Natural Reserve of Mantet. In the village of Mantet (1545 m), where the rain falls are monitored since 1995, the annual mean is 846,9 mm with a marked inter-annual variability (from 565 mm in 1998 to 1327 mm in 1996). During the year, dry period (winter, mostly February and March) alternate with more humid ones (spring, mostly May). The summer may experience violent storms that account for most important total rain falls in the upper parts of the valleys (where one finds *Tayloria splachnoides*). The annual mean temperature is 9,5° C at 1535 m and 5,8° C at 1930 m.

The substratum is mostly composed of metamorphic rock (gneiss) that gives rise to acidic soils. The vegetation of the Reserve is mostly made of coniferous forests, several herbaceous communities, heaths, springs, soligenous fens and raised-bogs and rocky habitats.

MATERIAL AND METHODS

This study is based upon examination of herbarium specimens (from PC) and fresh collections of plants referable to *Tayloria splachnoides* from France. The writings on the herbarium labels have been transcribed in full.

Herbarium specimens examined:

T. splachnoides (*sub. Tayloria splachnoides* (Schl.) Hook.): H. Bizot Savoie. – Peisey-Nancroix; Rosuel., 45°31'11''N 6°47'46''W – Altitude, 1600 m. Juillet 1949. Abbé Guillaumot PC0094380 and PC0094379 (Société d'Echanges de Muscinées).

Tayloria acuminata (*sub. Tayloria splachnoides* Hook): Bryotheca Gallica Dismier n° 378 Peisey, 45°32'50''N 6°45'17''W : sur le bois pourri Savoie 6.1930 vers 1700 leg. Guillaumot 2833. Herbier M. Bizot PC0094382 and PC0094383 (number on the sheet 2585).

Specimens collected in this study:

FRANCE: Pyrénéees Orientales, Mantet. North of the Coma de la Portella, 42°26'15''N 2°16'24''W, 2200 m, in the vicinity of a small alpine rivulet, 13 August 2007, *leg.*

V. Hugonnot. – Mantet, in the Coma de Bacivers, 42°26'52''N, 2°15'45''W, 2350 m, in the vicinity of a small alpine rivulet, 14 August 2007, *leg. V. Hugonnot.* – Mantet, along the riverside of Els Forquets, 42°27'14''N, 2°18'05'', 2000 m, in the vicinity of a small alpine rivulet, 14 August 2007, *leg. V. Hugonnot.*

The voucher specimens are deposited in the private herbarium of the author.

The morphological characters have been assessed in the course of our study from traditional examination of both dry and fresh plants.

The map is specimen based for France. For the rest of south-western Europe, the map is based on a compilation of the available literature (for Germany, Meinunger & Schröder, 2007, map 733 on page 684; for Poland, Szmajda, Bednarek-Ochyra & Ochyra *in* Ochyra & Szmajda, 1991, map 290 ; and the maps or lists available on the net (for Switzerland, Italia and Austria).

RESULTS

Morphology

Our material is rather variable as far as gametophyte is concerned, notably the dentation and size of the leaves (from lingulate obtuse and entire to rather acuminate and dentate to the middle part). The rhizoids are typically warty-papillose and do not possess brood-bodies. The young calyptrae consistently exhibit a proximal constriction.

The sporophyte shows a long seta (more than to 2 cm long), a reflexed peristome of 16 long and greatly contorted teeth, an exerted columella, and a shrinked urn (due to the transversal thickening of exothecial cells).

Distribution and ecology

From available data the range of *Tayloria splachnoides* in southern Europe includes south-eastern France, Switzerland, Italy and Austria. (Fig. 1), being this area one of the distribution centres of this species in the Holarctic. Localities are also found in Germany and Poland.

In the Natural Reserve of Mantet, the micro-sites where *Tayloria splachnoides* thrives are constantly north or north-east facing. The known populations have been found in the vicinity of small alpine rivulets or waterfalls, often over an organic layer of bleached humus (mixed with a proportion of detritic sand) in block-screes. The total absence of trees is noticeable in all the sites where the species has been recorded. Nevertheless, *Tayloria splachnoides* grows in micro-sites that are strictly protected from direct sun radiation (Fig. 2).

Associated bryophytic communities include semi-aquatic ones. These communities are dominated by *Brachythecium rivulare* Schimp., *Porella cordaeana* (Huebener) Moore, *Schistidium rivulare* (Brid.) Podp. Communities on organic substrata are dominated by *Sanionia uncinata* (Hedw.) Loeske, *Brachythecium salebrosum* (Hoffm. *ex* F. Weber *et* D. Mohr) Schimp., *Polytrichastrum alpinum* (Hedw.) G.L.Sm., *Plagiothecium cavifolium* (Brid.) Z. Iwats., etc

Associates of *Tayloria splachnoides* are scarce, including a few depauperate stems of *Bartramia ithyphylla* Brid., *Plagiochila porelloides* (Torrey *ex* Nees) Lindenb., *Plagiothecium cavifolium* (Brid.) Z. Iwats., *Pohlia cruda* (Hedw.) Lindb., *Polytrichastrum alpinum* (Hedw.) G.L. Sm., *Rhizomnium magnifolium* (Horik.) T.J. Kop. and *R. punctatum* (Hedw.) T.J. Kop.

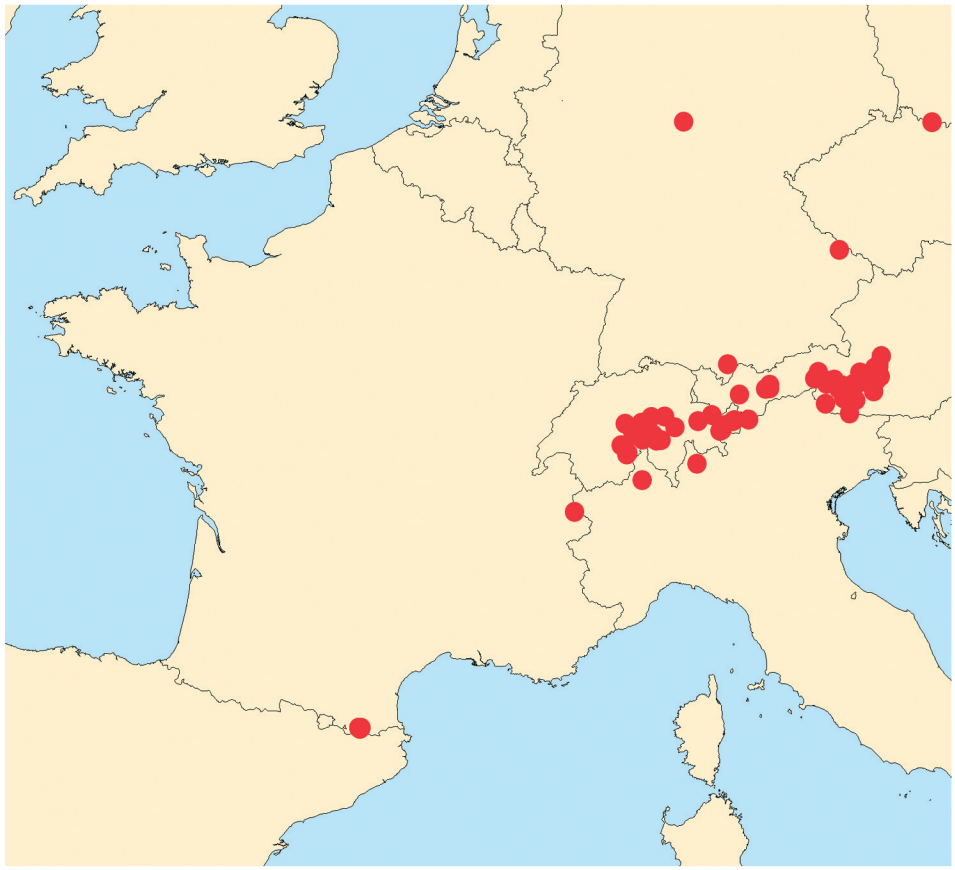

Fig. 1. Distribution of *Tayloria splachnoides* (Schleich. *ex* Schwägr.) Hook. in southern Europe.

The populations are rather scarce at the three sites. In each site, the major stands are generally small (of about 100 cm^2), but of densely intricate stems, with "satellites" in the vicinity of the major stands. Production of sporophytes is important (several hundreds of capsules at each site). Regarding phenology, the spores were shed in the Pyrenees during August 2007.

DISCUSSION AND CONCLUSION

The determination of the members of genus *Tayloria* subg. *Tayloria* may involve serious difficulties when sporophytes are absent. When they are present, several problems may remain in a few pairs of species, as for example *Tayloria tenuis* vs. *T. serrata* and *T. acuminata vs T. splachnoides.* Engler (1924), Crum (1955) and Mohan (1988) gave precise accounts aimed at differentiating *Tayloria acuminata* from *T. splachnoides*. The use of the keys and descriptions provided in these publications allowed us to refer unambiguously our material to *Tayloria splachnoides* notably on the basis of the long seta, exerted columella, shrinked urn

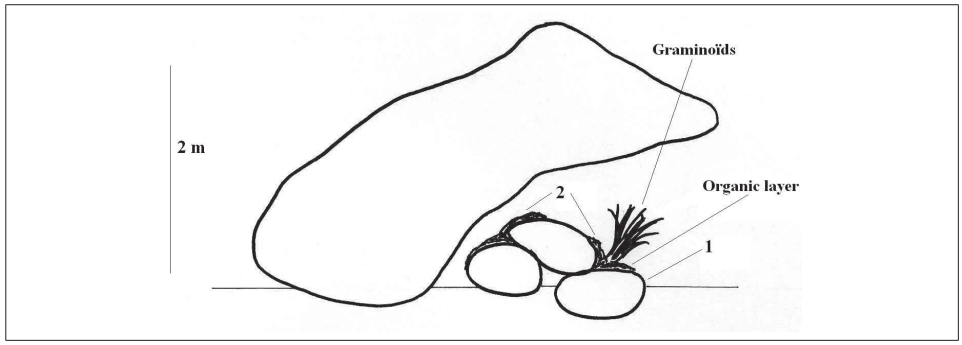

Fig. 2. Diagrammatic profile of the station of *Tayloria splachnoides* (Schleich. *ex* Schwägr.) Hook. 1: semi-submersed bryophytic grouping with *Brachythecium rivulare*, *Porella cordaeana*, *Schistidium rivulare*; 2: community with *Tayloria splachnoides*.

and the virtual absence of rhizoidal brood-bodies. From a morphological perspective, our material is quite typical.

From the examination of relevant literature, *Tayloria splachnoides* is a species of moist or humid sites, growing on rocks covered with humus, that are at times enriched with excrements (Engler, 1924; Crum, 1955; Mohan, 1988). It is described as coprophilous (Mohan, 1988) even though the nitrogen requirements appear often to be rather low, and then considered not linked with dung in Koponen (1977). *Tayloria splachnoides* has additionally been mentioned on soil, rotten wood, upturned roots of trees or dung of man or animals (Bruch *et al*., 1836-1851; Grout, 1940). In the French Pyrenees, *Tayloria splachnoides* does not appear to be linked to any source of animal dropping enrichment and it certainly does not behave as a coprophilous species.

There is an agreement in the literature to consider the species a typical subalpine-alpine one (from 1300 m to 2400 m), inhabiting high mountains in Europe. The altitudes of the Pyrenean localities (from 2000 to 2350 m) are in agreement with these data.

ECCB (1995) gives "montane forests" and Amann (1918) and Cortini-Pedrotti (2001) shaded and humid forests as typical habitats. We have shown above that, at least in the Pyrenees, *Tayloria splachnoides* grows in quite open habitats, although it does grow in much protected micro-niches.

Due to the great profusion of sporophytes, to the size of the spores (more or less 15 µm), to the absence of asexual mean of reproduction and to the peculiar ecology of *Tayloria splachnoides*, it can be ascertained that the species rely on a massive sporal investment of bare or almost bare organic surfaces that are created periodically by the winter submergence and violent erosive power of torrential currents. Despite rather intensive field research, we were unable to locate other populations than the three aforementioned in the Réserve Naturelle of Mantet. It is probable that the species is locally limited by rarity of suitable habitat. The Pyrenean known populations should be monitored in order to assess demographic tendencies and give insight towards a better understanding of its strategy.

The discovery of *Tayloria splachnoides* in the eastern Pyrenees is a significant extension range toward the south-western border of its known range. The species should equally be searched for in high mountains of Spain, where it likely occurs.

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