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# Bryological Notes

# Caducous branchlets in *Pterigynandrum filiforme* (Bryopsida: Pterigynandraceae)

*Pterigynandrum filiforme* Hedw. is a pleurocarpous moss with a circumpolar boreal-montane distribution (Smith, 2004) which grows mainly on rocks and trees. It is well known that *P. filiforme* frequently produces small, two- to five-celled axillary gemmae (Wheldon, 1905; Warnstorf, 1915; Crum, 1953). Modern bryophyte floras of Europe, North America and Japan which were published in the second half of the last century usually mention them. Less known is the fact that *P. filiforme* may also produce another kind of vegetative dispersal unit, namely caducous branchlets (Fig. 1), according to the terminology of Newton & Mishler (1994). These branchlets were first described by Warnstorf (1906). Later he (Warnstorf, 1915) wrote that these occur very rarely. He found them just once on a herbarium specimen collected by the Krause brothers in July 1880 near Bodö, Norway. He also suggested that these branchlets might develop into new plants.

Unaware of these early publications by Warnstorf (1906, 1915), I collected a propaguliferous specimen of *P. filiforme* on 10 September 2005 at the Lac de Coudré (Switzerland, Canton of Fribourg, Grandvillard, Western Swiss Prealps, Swiss grid co-ordinates: 575.98/153.60). The specimen was found on bark of *Acer pseudoplatanus* L. in a small but rather dense stand of this tree species growing on calcareous bedrock at 1350 m a.s.l. on a west-facing, gentle slope in a sheltered location just above the small lake. The mean yearly precipitation is approximately 1500 mm and the yearly mean temperature approximately 5.2°C (Bundesamt für Landestopographie, 2004).

The propaguliferous *P. filiforme* had a very striking habit due to the presence of numerous conspicuous branchlets (Fig. 1A, B). The branchlets are very easily detached, which suggests that they function as vegetative dispersal units. The length of the detached branchlets varies between 0.1 and 2.2 mm (mean: 0.79 mm; Fig. 2). Up to 20 branchlets are clustered together in the leaf axils. However, the branchlets detach individually and are usually unbranched. Except for the branchlets, no other special morphological characteristics were found that would distinguish the specimen from non-propaguliferous forms.

Wondering if these branchlets were known from other regions, I searched through 25 European, North American and Japanese regional or national floras, but the branchlets were not mentioned in any of them; neither are they described by Correns (1899) in his comprehensive book on vegetative dispersal in mosses. In addition, I checked approximately 260 specimens in the Z/ZT herbarium (approximately 220 specimens from Switzerland, 40 specimens from other European countries), but failed to find any other specimens with caducous branchlets.

The day after collecting the material, I started a minor cultivation experiment: approximately 200 branchlets were placed on a paper tissue moistened with tap water in a 9-cm-diameter Petri dish. The Petri dish was put outdoors on a north-facing window-sill which received no direct sunlight. The sample was checked weekly and moistened with tap water when necessary. At the start of the experiment, all branchlets were free of rhizoids. After 2 weeks, some of the branchlets had developed rhizoids, and after 4 weeks nearly all had formed rhizoids at irregular intervals, probably depending on which parts were in contact with the paper tissue (Fig. 1C). After approximately 2.5 months of cultivation, two of the branchlets had even developed axillary gemmae (Fig. 1D) typical of *P. filiforme*, although none were found in the original collection. The multicellular stalks on which these gemmae were produced in culture were much longer than those usually found in nature (cf. Warnstorf, 1915).

Caducous branchlets or similar structures are rarely found in pleurocarpous mosses, at least in the European bryophyte flora (Correns, 1899). However, a handful of species including *Platygyrium repens* (Brid.) Schimp., *Isopterygium elegans* (Brid.) Lindb., *Leucodon sciuroides* (Hedw.) Schwägr. and *Pseudoleskeella nervosa* (Brid.) Nyholm regularly bear caducous branchlets. Moreover, several species in the genus *Neckera* may produce caducous flagelliform branchlets (Correns, 1899; Smith, 2004). *Habrodon perpusillus* (De Not.) Lindb., another member of the Pterigynandraceae (Goffinet & Buck, 2004), almost always bears two- to five-celled gemmae closely similar to those in *P. filiforme* (Correns, 1899; Warnstorf, 1915; Smith, 2004). All of these species and *P. filiforme* are dioecious and are either saxicolous or epiphytic. Furthermore, all of them very rarely produce sporophytes in Switzerland (Amann, 1918). It is well known that dioecious species develop sporopyhtes less frequently than monoecious species (Longton & Hedderson, 2000) and that the former are more often found with asexual


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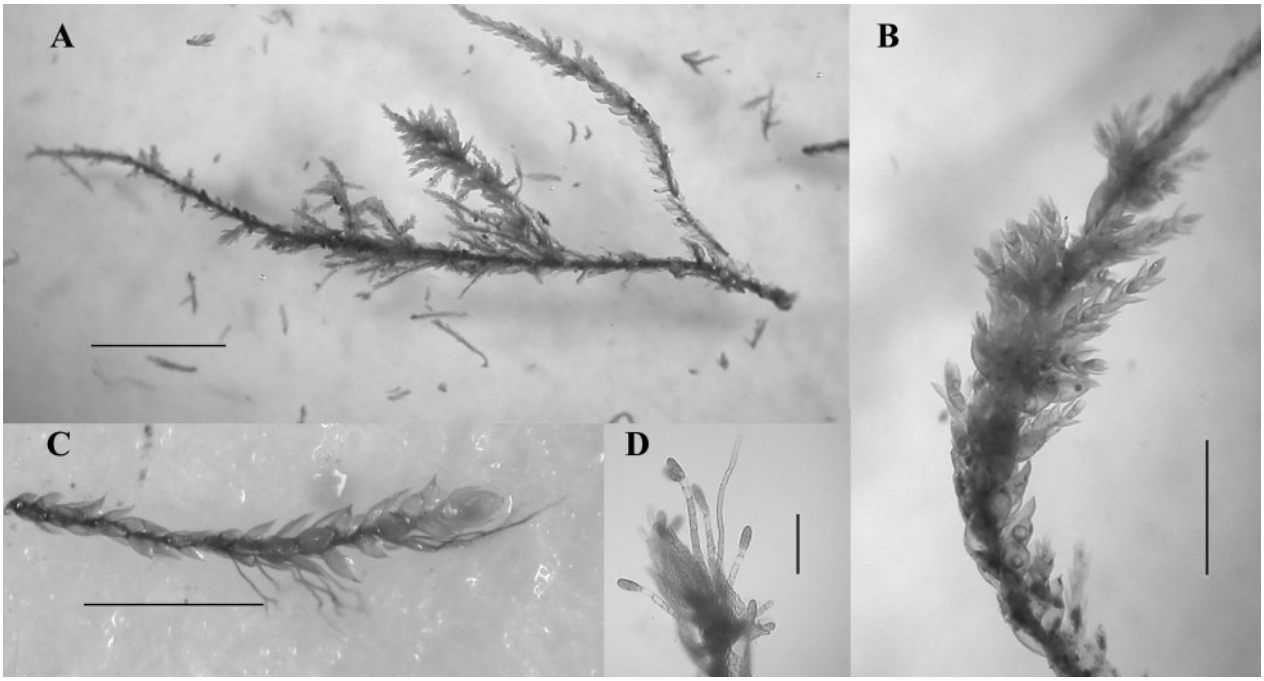


**Figure 1.** Caducous branchlets and gemmae of *Pterigynandrum filiforme*: (A) plant with clusters of caducous branchlets in leaf axils; (B) part of a stem with dense clusters of caducous branchlets; (C) detached caducous branchlet with rhizoids after growing 4 weeks on wet tissue in a Petri dish; (D) apex of a caducous branchlet bearing brownish, ovoid, three- or four-celled gemmae on long stalks. Scale bars: A=5 mm; B=2 mm; C=1 mm; D=100 $\mu$m

propagules (Longton & Schuster, 1983). The same applies to epiphytic species (Correns, 1899). Establishment from spores in dioecious species may result in the spatial separation of male and female gametophores. Thus, asexual propagules may be particularly important in building up and maintaining local populations founded by either a single spore or a single asexual propagule (Schuster, 1983).

The question remains as to whether the propaguliferous plants of *P. filiforme* are genetically distinct from non-propaguliferous forms, or if the branchlets (and the gemmae) are simply induced by particular environmental conditions. The occurrence of numerous sporophyte-bearing plants without caducous branchlets adjacent to the propaguliferous *P. filiforme* suggests the former. In this context, it should be noted, however, that axillary gemma production in *Dicranoweisia cirrata* Hedw. is solely dependent on the nutrient status of the substratum (Duckett, Goode & Matcham, 2001).

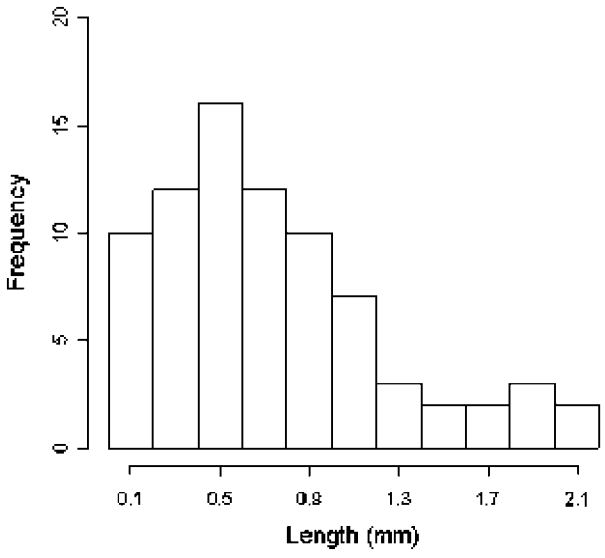


**Figure 2.** Frequency distribution of the lengths of detached caducous branchlets of *Pterigynandrum filiforme* ($n$=80).

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# New national and regional bryophyte records, 13

Intending contributors to this column should consult the Instructions for Authors in part 1 of this volume, and should address their contributions to the column editor.

1. ***Hygrohypnum styriacum*** (Limpr.) Broth.

**Contributors:** S. Rams and G. Oliván

**Spain:** PROV. GRANADA, Sierra Nevada (National Park), headwaters of the Guarnón river, 37°03'N 3°22"W, 3000 m a.s.l., shady hollow on mica-schist rock, with *Amblyodon dealbatus* (Hedw.) P.Beauv., *Amphidium mougeotii* (Bruch & Schimp.) Schimp., *Myurella julacea* (Schwägr.) Schimp. and *Philonotis fontana* (Hedw.) Brid., 16 September 2000, *leg.* R. M. Ros, *conf.* L. Hedenäs (MUB 17817).

This is the first report for *H. styriacum* in Spain. The species usually grows in irrigated crevices of granite or slate rocks in the alpine regions of the mountains. It has a boreal-montane distribution and is known in Europe from the mountainous regions of Norway, Sweden, Iceland and Britain, where it is rare, and from the Alps and Tatras (Carpathian Mountains), where it is more frequent. This is the most southerly record in this continent. Outside Europe it is known only from California to British Columbia in the Rocky Mountains in North America.

This taxon may be distinguished from other species in the genus by the relatively small size of the plants, erect-spreading leaves with the apex abruptly acuminate, the costa usually forked and reaching mid-leaf, and the leaf cells becoming rectangular towards the base but not forming a recognizable alar group. It is possible that this species has been confused with slender forms of *H. luridum* (Hedw.) Jenn. with a short and forked costa, from which it may be separated by the alar cells. In *H. luridum* these are quadrate to shortly rectangular, usually incrassate, yellow-ish-brown, and they form a differentiated group.

2. ***Leptobryum pyriforme*** (Hedw.) Wilson

**Contributors**: R. Ochyra and O. Tyshchenko

**Antarctic Peninsula:** Graham Coast, Argentine Islands, Galindez Island: (1) Meek Channel, north-east of the Vernadsky (formerly Faraday) Station, 65°14.771'S 64°14.870'W, in tufts of *Chorisodontium aciphyllym* (Hook.f. & Wilson) Broth., *Sanionia georgico-uncinata* (Müll.Hal.) Ochyra & Hedenäs, *Polytrichum strictum* Brid., *P. juniperinum* Hedw. and *Pohlia cruda* (Hedw.) Lindb. at sea level, 26 February 2004, *leg*. L. Manilo *3* (KRAM); (2) between Meek Channel and Woozle Hill, lat. 65°14.906'S 64°14.802'W, *ca* 50 m a.s.l., in tufts of *Pohlia nutans* (Hedw.) Lindb., *Sanionia georgico-uncinata* and *Bryum pseudotriquetrum* (Hedw.) P.Gaertn., B.Mey & Scherb., 26 February 2004, *leg*. L. Manilo *7* (KRAM).

*Leptobryum pyriforme* is a bipolar species which is locally frequent in Tierra del Fuego and Patagonia and extends to subantarctic South Georgia (Ochyra, Bednarek-Ochyra & Lewis Smith, 2002) and Antarctica. It was reported several times from the Antarctic continent (Imura *et al*., 1992; Kanda & Mochida, 1992; Kanda & Okada, 1993; Okada & Kanda, 1994) but these records correctly refer to *L. wilsonii* (Mitt.) Broth. (Arts, 2001). So far, the only correct record of *L. pyriforme* in the Antarctic is from geothermal soil on Deception Island in the South Shetland Islands archipelago (Lewis Smith, 1984a, b, 2005) and the plants are in fine fruiting condition (Lewis Smith *3644A*, AAS, KRAM). The present specimens originate from unheated ground on Galindez Island in the Argentine Islands archipelago at the Graham Coast off the Antarctic Peninsula and they represent the southernmost occurrence of the species. This region has been surveyed bryologically quite often since the early days of the botanical exploration of the Antarctic (Lewis Smith & Corner, 1973) but *L. pyriforme* was overlooked. This is because the species grows in small quantity intermingled in tufts of larger mosses such as *Chorisodontium aciphyllum*, *Polytrichum strictum*, *P. juniperinum*, *Sanionia georgico-uncinata*, *Pohlia nutans*, *P. cruda*, *Bryum pseudotriquetrum*, and the shoots of *L. pyriforme* were discovered in cultured material of these species. They are principal constituents of the *Polytrichum strictum–Chorisodontium aciphyllum* association within the moss turf sub-formation which form characteristic peat banks on Galindez Island (Lewis Smith & Corner, 1973). *Leptobryum pyriforme* is entirely sterile but it produces