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THREE MOSSES NEW FOR THE PYRENEES

Vincent Hugonnot

Le bourg, 43 270 Varennes-Saint-Honorat, France. E-mail: vincent.hugonnot@wanadoo.fr

Resumen: Los 3 musgos *Hypnum sauteri* Schimp., *Pohlia andrewsii* A.J. Shaw and *Tayloria lingulata* (Dicks.) Lindb. son nuevos para los Pirineos y se citan de los Pirineos Orientales (Francia). Se describen brevemente sus apetencias ecológicas y las nuevas localidades.

Abstract: *Hypnum sauteri* Schimp., *Pohlia andrewsii* A.J. Shaw and *Tayloria lingulata* (Dicks.) Lindb. are 3 moss species new for the Pyrenees. All 3 species are recorded from the Pyrénées-Orientales (France). Their ecological requirements and the new localities are briefly described.

Palabras clave: *Hypnum sauteri*, *Pohlia andrewsii*, *Tayloria lingulata*, musgos, distribución, Francia, Pirineos.

Keywords: *Hypnum sauteri*, *Pohlia andrewsii*, *Tayloria lingulata*, mosses, distribution, France, Pyrenees.

INTRODUCTION

In the course of bryological surveys in the Réserves Naturelles Catalanes (Pyrénées-Orientales, France), several species of interest have been observed. Among them, *Hypnum sauteri* Schimp. and *Pohlia andrewsii* A.J. Shaw are unknown in the Catalan Countries (Casas *et al*., 2001; Thouvenot, 2002) or in the mountain regions of Spain (Casas *et al*., 2006). In France, they have not been reported so far in the Pyrenees but are known to occur in isolated localities of the Massif Central and the Alps. The situation for *Tayloria lingulata* (Dicks.) Lindb. appears more complex because this species is mentioned as "rare" in France by Augier (1966). It has not been possible to trace any literature or herbarium record of this species in the Pyrenees, and it is therefore considered a novelty for these mountains.

In the present study, the new localities of these 3 species are described and a short synthesis of their distribution and ecology is provided.

METHODS

All the samples were collected by the author and are deposited in the private herbarium of V. Hugonnot. Nomenclature of liverworts and mosses follows, respectively, Grölle & Long (2000) and Hill *et al.* (2006).

RESULTS

Hypnum sauteri Schimp.

Hypnum sauteri is a tiny species, the smallest of the genus *Hypnum* (Ando, 1973). Critical morphological characters are: the extreme slenderness of the plant (leaves typically 0,5 mm long), the absence of a central strand and of a hyaloderm in the stem, the ovate pseudoparaphyllia restricted to base of branch, the very small and homogenous alar part (composed of less than 4 cells along the margin), the ovate-lanceolate and plicate perichaetial leaves and the small size of the spores (8-10 µm in diameter).

H. sauteri is a European endemic (Ando, 1973) which has been given the status "rare" in the European countries (E.C.C.B., 1995). The species is reported in northern Norway, the Jura, the Alps and the Tatra (Ando, 1973). In France, its presence was almost unnoticed until Bardat & Boudier (2006) discovered it on the Causse Mejean (Massif Central). The authors also mention an old locality in the department of Savoie, where the author of the present note recently found a new locality in Sardières (personal observation).

H. sauteri is a typical pioneer species of slightly humid and dark limestone wall, preferably in forest environment. The species thrives from mountain to subalpine belt. Frequent associates include *Campylophyllum halleri* and *Seligeria* spp. Its phytogeographical boreo-alpine affinities, combined with the apparent isolation of Pyrenean and Alps populations, clearly suggests a relict origin of the former. This is also the case envisaged by Bardat & Boudier (2006) for the locality of the southern Massif Central.

Surprisingly, in the Pyrenees, only one valley of the north side of the Mont Coronat seems to house *H. sauteri*. The populations are large and produce sporophytes in abundance. Surely *H. sauteri* deserves further study in the Réserve naturelle de Nohèdes, including aspects related to its demography, ecology, strategy and origin.

New localities (Figure 1). **Conflent:** Réserve naturelle de Nohèdes, Nohèdes, upper part of Coma de Pichou, on calcareous rocks in *Fagus sylvatica* and *Pinus sylvestris* wood, from 1.200 to 1.700 m (coordinates of the localities: 42°36'34" N 002°16'57" E, 42°36'19" N 002°16'52" E, 42°36'15" N 002°16'49" E), together with *Barbula crocea*, *Campyliadelphus chrysophyllus*, *Campylophyllum halleri*, *Cololejeunea calcarea*, *Ctenidium molluscum*, *Distichium capillaceum*, *Ditrichum flexicaule* var. *sterile*, *Myurella julacea*, *Orthothecium intricatum*, *Plagiobryum zieri*, *Platydyctia jungermannioides*, *Scapania aequiloba*, *S. aspera*, *Seligeria donniana* and *Tortella tortuosa*.

Pohlia andrewsii A.J. Shaw

Pohlia andrewsii is characterized by its shiny leaves when dry and clusters of small axillary propagula of rather uniform shape, from round to slightly elongate. They turn translucent red-orange with age and bear rudimentary to laminate primordial leaves (Shaw, 1981a).

P. andrewsii is an arctic-alpine taxon whose world distribution remains incomplete. The species is recorded mainly in the arctic and subarctic North America (Shaw, 1981a, 1981b, 1982), Greenland (Shaw, 1982), Arctic territories of the former USSR, southern Siberia, Altai Mountains, the Far East and the European part of the former USSR (Ignatov & Afonina, 1992). The species is rare in Norway (including Svalbard) and north-western Finland (Hallingbäck *et al*., 2008). Shaw (1982) also mentions Sweden. In Central Europe, *P. andrewsii* was recorded in the Austrian Alps (Nordhon-Richter, 1984) and Slovakia (Tatra Mountains: Kubinská & Janovicová, 1996). The species extends to western Europe in the Swiss (Bisang, 1994), German (Meinunger & Schröder, 2007) and French (Isère and Savoie: Skrzypczak, 2008) Alps. The species has most recently been observed in Massif Central (Puy-de-Dôme) by the author (personal observation).

P. andrewsii is considered a typical species of humus-rich cracks of rocks in the tundra (Shaw, 1981a). It has also been observed directly on the ground. The species can occasionally be found on eroded slopes along rivers and even on artificial embankments. In the Alps and the Pyrenees, the species always grows in rock cracks in altitudes generally above 2.000 m. Although many others species of propaguliferous *Pohlia* have been identified in the mountain and alpine belts of the Pyrénées-Orientales (*P. andalusica*, *P. annotina*, *P. bulbifera*, *P. camptotrachela*, *P. drummondii*, *P. filum*, *P. proligera*: personal observations), and although mixed stands of different species of *Pohlia* are frequent, very few other species of *Pohlia* are found admixed with *P. andrewsii*. It is thus possible that a marked ecological segregation, well documented with other taxa of the same genus (Shaw, 1981c; Akiyama *et al*., 2009), would be responsible for the exclusion of other species of at least part of the niche typically frequented by *P. andrewsii*. In fact, in the Pyrénées-Orientales, most other propaguliferous *Pohlia* are more or less restricted to wet and disturbed habitats, including those impacted by livestock in boggy habitats. On the contrary, in the three sites of Nohèdes, Prats de Mollo and Py, *P. andrewsii* is able to colonize dry or wet rocky crevices in alpine environments. These habitats are directly affected by natural erosion due to extreme winter temperatures and cryoturbation combined with steep slopes. *Pohlia andrewsii* is less frequently found in wet habitats disturbed by grazing stock.

The occurence of *P. andrewsii* in the Arctic region and in areas of altitude in the Alps and the Pyrenees could be linked to fluctuations in the extension of Quaternary glaciers. *Pohlia andrewsii* could therefore be regarded as relict in the high mountains of the eastern chain of the Pyrenees.

New localities (Figure 1). **Vallespir:** Réserve naturelle de Prats de Mollo, Els Manarassous, in a eroded rivulet, among rocks, 1.700 m (42°24'21" N 002°21'40" E), together with *Calypogeia fissa*, *C. muelleriana*, *Diplophyllum obtusifolium*, *Ditrichum heteromallum*, *Jungermannia hyalina*, *Pogonatum urnigerum* and *Pohlia andalusica*; **Vallespir:** Réserve naturelle de Prats de Mollo, under the Sources du Tech, in the rocks in the vicinity of a rivulet, 2.300 m (42°25'18" N 002°19'35" E), together with *Bartramia ithyphylla*, *Fissidens osmundoides*, *Oligotrichum hercynicum*, *Pellia neesiana* and *Pogonatum urnigerum*); **Vallespir:** Réserve naturelle de Prats de Mollo, Bac de Costabonne, in the

cracks of rocks, 2.250 m (42°25'10" N 002°20'20" E), together with *Anastrophyllum minutum*, *Diplophyllum taxifolium*, *Gymnomitrion concinnatum*, *Heterocladium dimorphum* and *Mnium lycopodioides*); **Conflent:** Réserve naturelle de Py, Campmagre, eutrophicated and disturbed fen, 2.130 m (42°27'03" N 002°22'27" E), together with *Cephalozia bicuspidata*, *C. lunulifolia*, *C. pleniceps*, *Chyloscyphus pallescens*, *Dicranum bonjeanii*, *Lophozia incisa*, *Pellia neesiana*, *Ptilidium ciliare*, *Rhizomnium magnifolium* and *Scapania irrigua*; **Conflent:** Réserve naturelle de Nohèdes, north of Font de la Perdrix, dry subalpine rocks, 2.300 m (42°38'36" N 002°12'03" E), together with *Anastrophyllum minutum*, *Anthelia juratzkana*, *Bartramia ithyphylla*, *Diplophyllum albicans*, *Distichium capillaceum*, *Encalypta microstoma*, *Eurhynchiastrum pulchellum*, *Gymnomitrion concinnatum* and *Saelania glaucescens*.

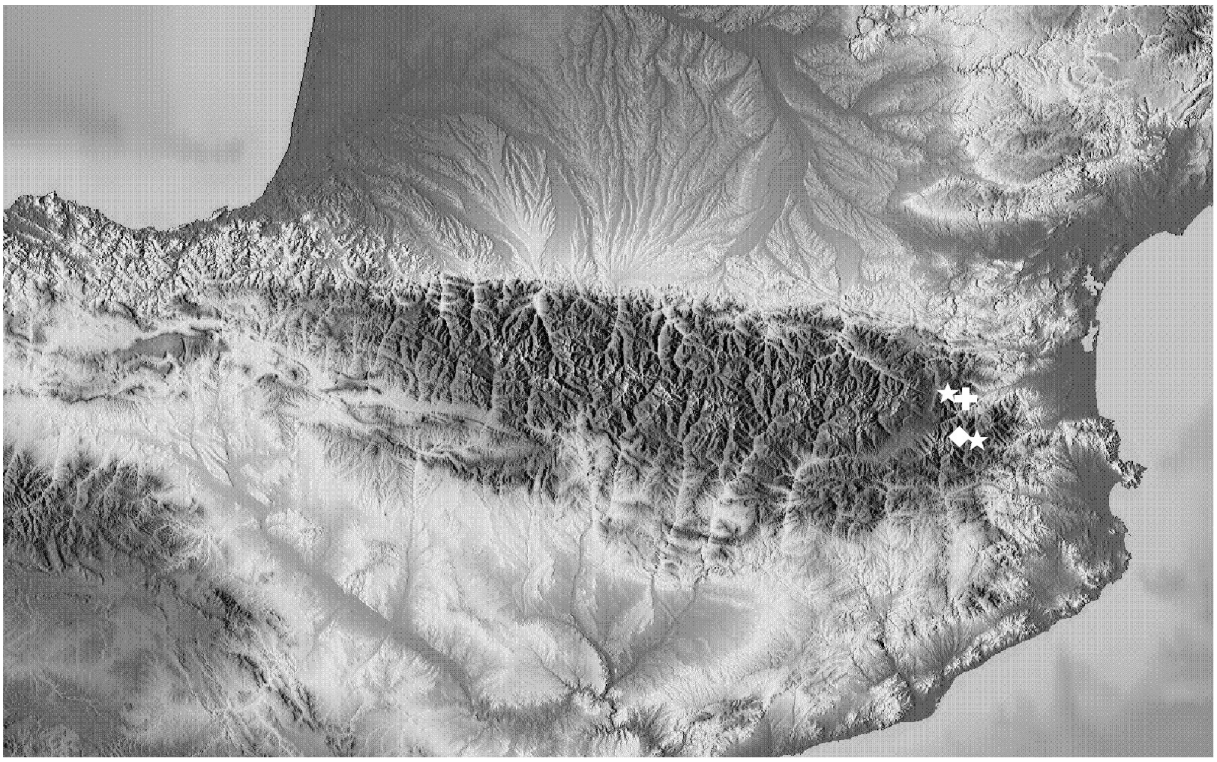

Figure 1. Localities of *Hypnum sauteri* Schimp. (+), *Pohlia andrewsii* A.J. Shaw (*) and *Tayloria lingulata* (Dicks.) Lindb. (♦) in the Pyrenees.

Tayloria lingulata (Dicks.) Lindb.

Tayloria lingulata is best characterized by its lingulate leaves, broadly rounded at the apex and the peristome teeth held erect when dry. *Tayloria froelichiana* has rather short and ovate cucullate leaves (longer, lingulate and with plane apex in *T. lingulata*) and a short and massive seta (longer and weaker in *T. lingulata*).

T. lingulata is an arctic-alpine species widely spread in Central and Northern Europe, in the northern, eastern and arctic parts of the former USSR (Ignatov & Afonina, 1992), in

Greenland, Iceland, and North America (Szmajda *et al.*, 1991). As regards the French part of the Pyrenees, it is not cited in Husnot (1892-1894).

T. lingulata is typically linked to wet alpine fen-pasture and is mostly recorded on shallow peat (Szmajda *et al.*, 1991; Meinunger & Schröder, 2007). Calcareous rocks (Augier, 1966) are also mentioned. In the Pyrénées-Orientales, *T. lingulata* was found growing in overgrazed alpine fens. Remarkably, those habitats exhibit an arctic physiognomy, with an alternance of hummocks (made of *Oncophorus wahlenbergii*, *Polytrichastrum longisetum*…) and depressions (with *Warnstorfia sarmentosa*, *Scapania irrigua*…). Cattle trampling and erosion of the organic layer is intense in the habitats of *T. lingulata* and a monitoring of habitats should usefully be undertaken in order to gain a better understanding of the demographic tendencies.

With the addition reported in the present account, the eastern part of the Pyrenees shows a remarkable richness in species of the genus *Tayloria*, 4 additional members having been recorded so far: *T. splachnoides* (Hugonnot, 2009), *T. froelichiana* (Hébrard *et al*., 1988), *T. serrata* and *T. tenuis* (Thouvenot, 2002).

New localities (Figure 1). **Conflent:** Réserve naturelle de Mantet, Mantet, Campmagre, on eroded mounds of organic material in a fen, 2.300 m (42°25'53" N 002°19'17" E), together with *Bryum pseudotriquetrum*, *Cephalozia bicuspidata*, *Dicranum bonjeanii*, *Lophozia ventricosa*, *Oncophorus wahlenbergii*, *Pohlia bulbifera*, *P. nutans*, *Polytrichastrum alpinum*, *P. longisetum*, *Rhizomnium punctatum*, *Sanionia uncinata*, *Scapania irrigua* and *Warnstorfia exannulata*. **Conflent:** Mantet, Campmagre, at the lower part of Sphagna hummocks near a rivulet, 2.300 m (42°26'11" N 002°18'36" E), together with *Aneura pinguis*, *Bryum pseudotriquetrum*, *Calypogeia azurea*, *Campylium stellatum*, *Cephalozia bicuspidata*, *Dicranum bonjeanii*, *Fissidens osmundoides*, *Lophozia incisa* subsp. *opacifolia*, *L. ventricosa*, *Odontoschisma elongatum*, *Oncophorus virens* and *Warnstorfia sarmentosa*. **Conflent:** Mantet, Campmagre, on eroded mounds of organic material in a fen, 2.300 m (42°25'54" N 002°19'18" E), together with *Barbilophozia kunzeana*, *Bryum pseudotriquetrum*, *Gymnocolea inflata*, *Oncophorus wahlenbergii*, *Polytrichastrum longisetum*, *Scapania irrigua*, *Straminergon stramineum*, *Tortella tortuosa*, *Warnstorfia exannulata* and *W. sarmentosa*.

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