

## THREE BRYOPHYTES NEW TO ROMANIA

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*Drepanocladus pseudostramineus* and *Schistidium trichodon* reported from the Bihar Mts and *Cephaloziella massalongi* from the Harghita Mts are new to the bryophyte flora of Romania. The occurrence of *Drepanocladus pseudostramineus* is reported from the Padis karst area from a surprisingly low altitude.

Key words: bryophytes, *Cephaloziella massalongi*, *Drepanocladus pseudostramineus*, *Schistidium trichodon*, Romania

### INTRODUCTION

The author organised two collecting trips in the Carpathians in 1999, to the Harghita and the Bihar Mts, respectively. One liverwort and two mosses from the collected material proved to be new to the flora of Romania. A brief description on the identification of the species with some bryogeographical remarks is provided in this report.

### MATERIAL AND METHODS

For the identifications of the specimens collected, the works of HEDENÁS (1993), JANSSENS (1983) and SMITH (1978, 1990) were used. The identifications were confirmed by Sándor ORBÁN and Tamás PÓCS (Eger). The nomenclature follows DÜLL (1983, 1984, 1985).

The specimens have been deposited in the private collection of the author (Szarvas) and in the Herbarium of the Hungarian Natural History Museum (Budapest, BP).

List of geographical names used in the text:

English	Hungarian	Romanian
Harghita Mts	Hargita-hegység	Munții Harghita
Tolvajos stream	Tolvajos-patak	Paraul Talharului
—	Kirulfürdő	Băile Chirui
Kalibáskő rock	Kalibáskő	Piatra Colibei
Bihar Mts	Bihar-hegység	Munții Bihar
Barsa pit	Bársza-katlan	Groapa de la Barsa
Barsa ice-cave	Bársza-barlang	Ghețarul Barsa
Black pond	Fekete-tó	Lacul Negru
Fortress of Ponor	Csodavár	Cetățile Ponorului
Black cave	Fekete barlang	Peșterea Neagra

Eszkimó ice-cave	Eszkimó jégbarlang	Ghețărul Focul Viu
Ponor glade	Ponor-rét	Poiana Ponor
Spring of Ponor glade	Ponor-rét forrása	Izvorul Poiana Ponor
Cold spring	Hideg-forrás	Izvorul Rece
Bear valley	Medve-völgy	Valea Ursului

## RESULTS AND DISCUSSION

### **Cephaloziella massalongi** (Spruce) K. Müll.

Syn.: *Cephalozia massalongi* Spruce, *Cephalozia compacta* (Joerg.) Müll. Frib., *Cephaloziella perssonii* K. Müll.

Some bryophytes were collected on 19 June, 1999 from rock cavities of the "Kalibáskő" rock (Harghita Mts.) on the way to the famous "Hargitaliget" fen (NYÁRÁDY 1929). This boulder is situated beside the "Tolvajos" stream opposite to the spring named "Festő-borvízkút" near the road towards Kirulyfűrdő village. The cavities in the conglomerate rock were carved by the stream. Extensive mats of *Cephaloziella massalongi* were found in these cavities, together with *Conocephalum conicum* (L.) Lindb., *Lepidozia reptans* (L.) Dum., *Dicranella subulata* (Hedw.) Schimp., *Gymnostomum aeruginosum* Sm., *Leptobryum pyriforme* (Hedw.) Wils., *Pohlia prolifera* (Kindb. ex Breidl.) Lindb. ex H. Arn. and *Rhabdoweisia fugax* (Hedw.) B., S. et G. Outside the cavities *Sphenobolus minutus* (Schreb. in Cranz) Berggr., *Tritomaria exsecta* (Schmid. ex Schrad.) Schiffn. ex Loeske, *Amphidium mougeotii* (B. et S.) Schimp., *Bartramia halleriana* Hedw., *Dicranum montanum* Hedw., *Leucobryum juniperoideum* (Brid.) C. Muell., *Leucobryum glaucum* (Hedw.) Aongstr. and *Pohlia nutans* (Hedw.) Lindb. grow on the rock.

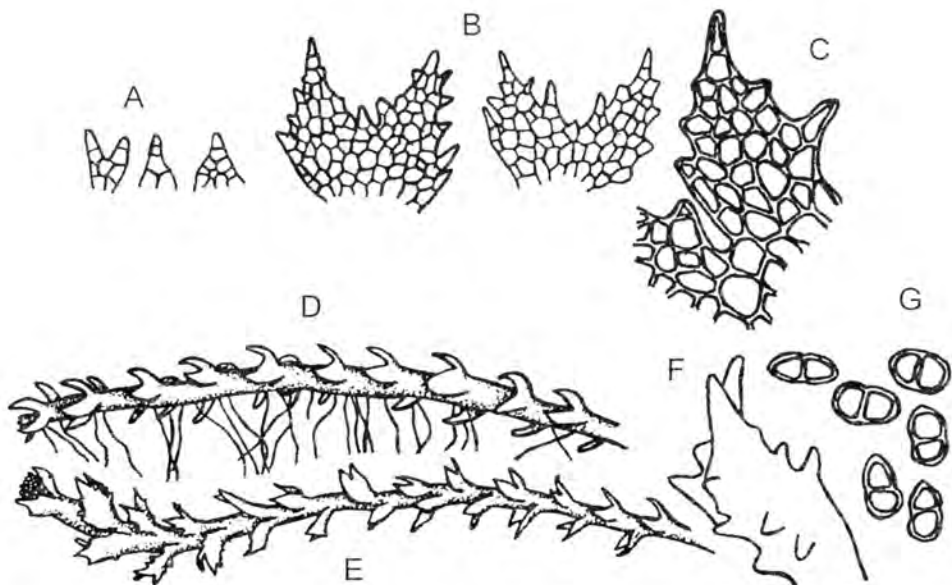
*Cephaloziella massalongi* is new to the bryophyte flora of Romania (see DÜLL 1983).

Description of *Cephaloziella massalongi* according to Smith (1990): Probably dioecious. Plants very slender, in yellowish-green or green to reddish-brown or blackish, sometimes extensive patches, mats or turfs. Shoots prostrate to erect, 120–280(–320)  $\mu\text{m}$  wide, stems branching irregularly, 40–80(–100)  $\mu\text{m}$  wide, dorsal cortical cells 10–16  $\mu\text{m}$  wide. Leaves on sterile stems distant to approximate or subimbricate,  $\pm$ transversely inserted, patent to erecto-patent or with basal part patent and lobes  $\pm$ erect, concave channelled, 80–100  $\mu\text{m}$  long, 80–160  $\mu\text{m}$  wide, margins irregularly dentate to sinuose-dentate or  $\pm$ entire, bilobed to 0.6–0.9, sinus acute, lobes lanceolate to narrowly triangular, (2–)4–8 cells wide at base, these cells 10–16  $\mu\text{m}$  wide, walls thin and colourless or more usually thickened, some-

times heavily so and reddish-brown cuticle usually densely papillose, sometimes with conical protrusions on back of leaf below sinus. Underleaves present on sterile stems, subulate to lanceolate and bilobed, 40–90(–120)  $\mu\text{m}$ , entire or toothed. Gemmae common,  $\pm$ ellipsoid, reddish-brown to purplish, (1–)2-celled, (12–) 16–26  $\mu\text{m}$  long, 10–16  $\mu\text{m}$  wide.

The most distinctive features of the species (SMITH 1990), like the presence of underleaves on sterile stems, toothed leaf margins, papillose leaf cuticle, non-angular or non-papillose gemmae can be easily recognised on the material. The plant was fertile with lots of capsules and perianths. It is interesting, because fertile plants are quite rare (SMITH 1990) (Fig. 1).

In the valley of the “Tolvajos” stream, close to this location, a former colour mill used to make brown colour from limonite (bog-iron). The limonite-rich springs paint the stream brick-red, and the water of the stream paints the base of the “Kalibáskő” rock as well. This metal-rich substrate could be similar to mine-spoils has reported *Cephaloziella massalongi* in Europe (SMITH 1990).



**Fig. 1.** *Cephaloziella massalongi*: A = underleaves from sterile stems; B = leaves from sterile stems; C = lobe of leaf from sterile stem; D and E = sterile shoots with entire and dentate leaves; F = leaf from shoot 5 in side view; G = gemmae (SMITH 1990).

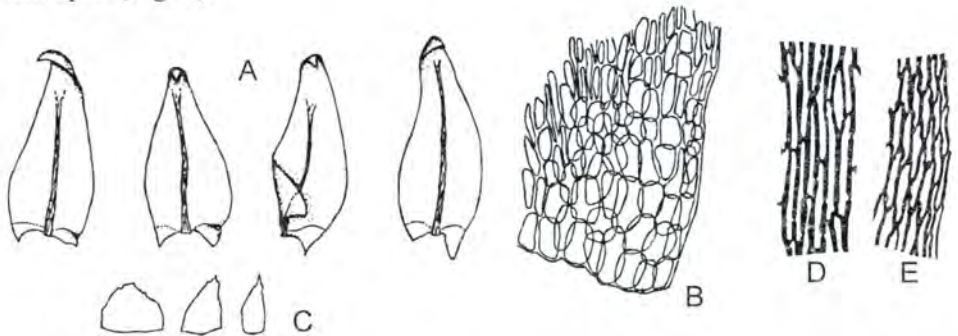
## *Drepanocladus pseudostramineus* (C. Muell.) G. Roth

Syn.: *Calliergidium pseudostramineum* (C. Muell.) Grout, *Drepanocladus fluitans* f. *pseudostramineus* Moenk., *Warnstorfia pseudostraminea* (C. Muell.) Tuom. et T. Kop.

The Barsa pit is a closed basin of the Padis–Fortress of Ponor depression in the Bihor Mts. The so-called Black pond is a suspended doline-pond with dark water in the Barsa pit near the Barsa ice-cave. The pond is surrounded by *Picea* forest. During our field survey on 18 August, 1999 some sedges on the shore and one moss species were found in the water. The latter proven to be the rare *Drepanocladus pseudostramineus* which is new to the bryophyte flora of Romania.

Description of *Drepanocladus pseudostramineus* according to HEDENÄS (1993): Medium-sized, sparsely or sparsely radially branched plants, green, yellow-green or brownish. Stem leaves narrowly ovate-triangular or ovate,  $\pm$ straight or slightly falcate; margin  $\pm$ entire to finely denticulate; nerve weak or rather strong, reaching just above mid-leaf to 4/5 way up the leaf. Alar cells forming an isodiametric or, more rarely transversely triangular group; supra-alar cells often forming an oval or rectangular group along lower leaf margin. Stem leaf apex acuminate or obtuse, often incurved.

*Drepanocladus pseudostramineus* is closely related to *D. tundrae* (Arn.) Loeske. *D. pseudostramineus* is distinguished by less decurrent alar cell groups, a more circular stem transverse section and often a narrowly obtuse apex (Janssens 1983). Both species form the connecting link between *Warnstorfia* and the true *Calliergon* species (TUOMIKOSKI and KOPONEN 1979). The specimen was easily distinguishable from the *Calliergon* species with its leaves gradually tapering to an acumen, and from the other *Drepanocladus* and *Warnstorfia* species with the features mentioned above. The most conspicuous feature is the obtuse and incurved leaf apex (Fig. 2).



**Fig. 2.** *Drepanocladus pseudostramineus*: A = stem leaves; B = alar cells; C = pseudoparaphylla; D = medial leaf cells; E = marginal leaf cells halfway up the leaf (HEDENÄS 1993, JANSSENS 1983).

*Drepanocladus pseudostramineus* is a subarctic moss. The Black pond is just about 1350 m above sea level. This is a surprising occurrence because of the quite low altitude. However, if we consider that numerous bryophytes with arctic and alpine character occur in the Padis area at such a low altitude this new data is not an extraordinary one. Such species include *Mylia taylorii* (Hook.) S. F. Gray, *Bryum uliginosum* (Brid.) B. et S., *Heterocladium heteropterum* B., S. et G. (Eszkimó ice-cave), *Myrinia pulvinata* (Wahlenb.) Schimp., *Plagiobryum zierii* (Hedw.) Lindb. (BOROS and VAJDA 1974), *Platydictya jungermannioides* (Brid.) Crum., *Tortella fragilis* (Drumm.) Limpr. (Black cave), *Cyrtomnium hymenophylloides* (Hueb.) Nyh. ex T. Kop. (Barsa ice-cave), *Amblyodon dealbatus* (Hedw.) B. et S. (Ponor glade), *Meesia uliginosa* var. *alpina* (Funck ex Bruch) Hampe (Fortress of Ponor) (JAKAB 2000). This phenomenon can be easily interpreted with the special geological features of the area (ice-caves, deep depressions) which cause the inversion of climate and certain changes in the vegetation. The thermal inversion is particularly characteristic of this area (CSÜRÖS 1981, POP 1997). On the other hand, the bryophytes, compared with vascular plants, have relative low habitat requirements, that is, they are more flexible in this regard.

### **Schistidium trichodon** (Brid.) Poelt

Syn.: *Schistidium apocarpum* subsp. *longidens* (Philib.) Wijk et Marg., *Grimmia trichodon* Brid.

The author has collected a blackish *Schistidium* from bare rock surfaces and near springs in the Bihor Mts, which proved to be the rare *S. trichodon*. It is a rare boreal-montane element and again, is new to the bryophyte flora of Romania.

Description of *S. trichodon* according to Smith (1978): Plants blackish, stems leafless below; hair-point 0–60 µm long; nerve and cells smooth above or with low papillae. Peristome teeth (450–)500–650(–750) µm long, filiform, fragile; spores 8–10 µm. Capsule common in winter. Blackish, straggling patches on basic, montane rocks.

The filiform, long peristome teeth, and the short hair-points can be easily recognised on the specimen. The leaf apex is slightly denticulate in the collected material which does not agree with Smith's (1978) description. *S. trichodon* is blackish and much larger than the common *S. apocarpum* (Hedw.) B. et S. (Fig. 3).

On 17 August, 1999 the bryophytes of the Fortress of Ponor were studied. The Fortress of Ponor is the most grandiose karstic formation in Transsylvania. It consists of three big stone circles which lie in a huge afforested depression of 300 m deep and more than 1 km in diameter at its upper level. The following bryophytes were recorded from the location: *Barbilophozia kunzeana* (Hueb.) K. Muell., *Ble-*

*pharostoma trichophyllum* (L.) Dum., *Calypogeia muelleriana* (Schiffn.) K. Muell., *Calypogeia suecica* (H. Arn. et J. Perss.) K. Muell., *Cephalozia bicuspidata* (L.) Dum., *Cephaloziella rubella* (Nees) Warnst. var. *sullivanti* (Aust.) K. Muell., *Fossombronia* sp., *Mylia taylorii* (Hook.) S. F. Gray, *Nowellia curvifolia* (Dicks.) Mitt., *Plagiochila asplenioides* (L. emend. Tayl.) Dum., *Preissia quadrata* (Scop.) Nees, *Scapania aspera* H. Bernet, *Tritomaria quinquedentata* (Huds.) Buch, *Amblystegium tenax* (Hedw.) C. Jens., *Bryum pallens* Sw., *Bryum uliginosum* (Brid.) B. et S., *Campylium halleri* (Hedw.) Lindb., *Campylium stellatum* (Hedw.) C. Jens., *Cinclidotus fontinaloides* (Hedw.) P. Beauv., *Ctenidium molluscum* (Hedw.) Mitt., *Distichum capillaceum* (Hedw.) B., S. et G., *Ditrichum flexicaule* (Schwaegr.) Hampe, *Eucladium verticillatum* (Brid.) B., S. et G., *Gymnostomum aeruginosum* Sm., *Hygrohypnum luridum* (Hedw.) Jenn., *Hylocomium umbratum* (Hedw.) B., S. et G., *Isopterygium pulchellum* (Hedw.) Jaeg., *Meesia uliginosa* var. *alpina* (Funck ex Bruch) Hampe, *Orthothecium intricatum* (Harm.) B., S. et G., *Orthothecium rufescens* B., S. et G., *Plagiobryum zierii* (Hedw.) Lindb., *Plagiomnium medium* (B. et S.) T. Kop. subsp. *medium*, *Plagiothecium undulatum* (Hedw.) B., S. et G., *Platydictya jungermannioides* (Brid.) Crum., *Pohlia cruda* (Hedw.) Lindb., *Polytrichum formosum* Hedw., *Ptilium crista-castrensis* (Hedw.) De Not., *Rhytidiadelphus subpinnatus* (Lindb.) T. Kop., *Rhytidiadelphus triquetrus* (Hedw.) Warnst., *Sanionia uncinata* (Hedw.) Loeske, *Sphagnum girgensohnii* Russ., *Sphagnum squarrosum* Crome, *Timmia austriaca* Hedw., *Timmia megapolitana* subsp. *bavarica* (Hessl.) Brassard.

Another location of the species is the Ponor glade, which is a closed depression surrounded by partly afforested slopes. This is one of the few most typical polies in Romania. A small spring appears at the northeastern side of it.

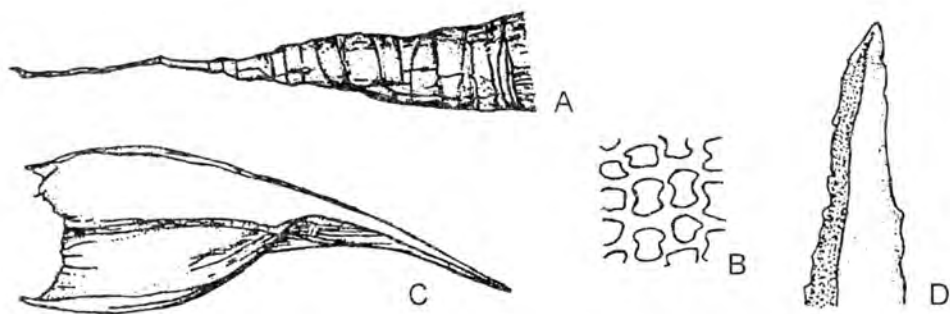


Fig. 3. *Schistidium trichodon*: A = peristome tooth; B = mid-leaf cells; C = leaf; D = leaf apex in side view (SMITH 1978).

At the Spring of Ponor glade, *Schistidium trichodon* is found together with *Conocephalum conicum* (L.) Lindb., *Jungermannia exsertifolia* Steph. subsp. *cordifolia* (Dum.) Váňa, *Marchantia polymorpha* L. emend. Burgeff, *Amblyodon dealbatus* (Hedw.) B. et S., *Bryum pallens* Sw., *Bryum pseudotriquetrum* (Hedw.) Gaertn. et al. var. *binum* (Schreb. in Hedw.) Lilj., *Bryum pseudotriquetrum* (Hedw.) Gaertn. et al. var. *pseudotriquetrum*, *Calliergonella cuspidata* (Hedw.) Loeske, *Campylium stellatum* (Hedw.) C. Jens., *Climacium dendroides* (Hedw.) Web. et Mohr, *Cratoneuron commutatum* (Hedw.) Roth, *Cratoneuron filicinum* (Hedw.) Spruce, *Ctenidium molluscum* (Hedw.) Mitt., *Distichum capillaceum* (Hedw.) B., S. et G., *Dydimodon spadiceus* (Mitt.) Limpr., *Hygrohypnum ochraceum* (Turn. ex Wils.) Loeske, *Mnium marginatum* (With.) Brid. ex P. Beauv., *Myrinia pulvinata* (Wahlenb.) Schimp., *Plagiomnium undulatum* (Hedw.) T. Kop., *Thuidium delicatulum* (Hedw.) B., S. et G. var. *delicatulum*.

The third record of the species is from the Cold spring. It is a karst-spring abounding in water in the Bear valley. *Schistidium trichodon* was recorded here with *Bryum uliginosum* (Brid.) B. et S., *Ctenidium molluscum* (Hedw.) Mitt., *Dichodontium pellucidum* (Hedw.) Schimp., *Distichum capillaceum* (Hedw.) B., S. et G., *Dydimodon spadiceus* (Mitt.) Limpr., *Hygrohypnum luridum* (Hedw.) Jenn., *Mnium marginatum* (With.) Brid. ex P. Beauv., *Plagiopus oederiana* (Sw.) Crum et Anders., *Platydictya jungermannioides* (Brid.) Crum, *Ptilium crista-castrensis* (Hedw.) De Not., *Rhynchostegium riparioides* (Hedw.) C. Jens., *Sanionia uncinata* (Hedw.) Loeske, *Timmia megapolitana* subsp. *bavarica* (Hessl.) Brassard.

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## References

- BOROS, Á. and VAJDA, L. (1974): Bryogeographische Forschungen im Karstgebiet des Bihar-Gebirges. – *Acta Bot. Acad. Sci. Hung.* **20**(1–2): 3–11.
- CSŰRÖS, I. (1981): A Nyugati-Szigethegység élővilágáról. – Tudományos és Enciklopédiai Könyvkiadó, Bukarest, 303 pp.
- DÜLL, R. (1983): Distribution of the European and Macaronesian Liverworts (Hepaticophytina). – *Bryol. Beitr.*, Duisburg, **2**: 1–114.
- DÜLL, R. (1984): Distribution of the European and Macaronesian Mosses (Bryophytina). Part I. – *Bryol. Beitr.*, Duisburg, **4**: 1–107.
- DÜLL, R. (1985): Distribution of the European and Macaronesian Mosses (Bryophytina). Part II. – *Bryol. Beitr.*, Duisburg, **5**: 110–232.

- HEDENÄS, L. (1993): *Field and microscope keys to the Fennoscandian species of the Calliargon-Scorpidium-Drepanocladus complex, including some related or similar species.* – Biodetector AB, Märsta, 79 pp.
- JAKAB, G. (2000): Adatok a Pádis karsztvidékének mohafldrájához (Bihar-hegység, Románia). – *Crisicum* 3 (in press).
- JANSSENS, J. A. (1983): Past and extant distribution of Drepanocladus in North America, with notes on the differentiation of fossil fragments. – *J. Hattori Bot. Lab.* 54: 251–298.
- NYÁRÁDY, E. Gy. (1929): A vizek és vízben bővelkedő talajok növényzetéről a Hargitában. – Emlékkönyv a Székely Nemzeti Múzeum 50 Éves Jubileumára, pp. 557–615.
- POP, C. (1997): *Padis.* – Chrysopeea Press, Cluj, 35 pp.
- SMITH, A. J. E. (1978): *The moss flora of Britain and Ireland.* – Cambridge University Press, Cambridge, 706 pp.
- SMITH, A. J. E. (1990): *The liverworts of Britain and Ireland.* – Cambridge University Press, Cambridge, 362 pp.
- TOUMIKOSKI, R. and KOPONEN, T. (1979): On the generic taxonomy of Calliargon and Drepanocladus (Musci, Amblystegiaceae). – *Ann. Bot. Fenn.* 16: 213–227.

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