

SCHISTOSTEGA PENNATA (BRYOPSIDA, SCHISTOSTEGACEAE) IN THE POLISH CARPATHIANS (POLAND)

BEATA CYKOWSKA

Beata Cykowska, Laboratory of Bryology, Institute of Botany, Polish Academy of Sciences, Lubicz 46, PL-31-512 Kraków, Poland; e-mail: cykowska@ib-pan.krakow.pl

Schistostega pennata (Hedw.) F. Weber & D. Mohr was found for the first time in Poland at Ustroń in the Western Beskidy Mts by Milde (1852). In April 2006, during a botanical excursion to the Wąwóz Wodospad ravine near Ciężkowice in the Pogórze Ciężkowickie foothills, the author found a new locality of this moss, which is rare in the Carpathians. This is the first locality of the species in this region and its third locality in the Polish Carpathian foothills.

Schistostega pennata is the only representative of the family *Schistostegaceae* in the world (Corley *et al.* 1981; Ochyra *et al.* 1988, 2003; Crosby *et al.* 1999). It is a characteristic species, difficult to misidentify, with its distichous confluent leaves and luminescent protonemata.

In Europe, *Schistostega pennata* grows mostly on soft, often crumbling soil in dark recesses of

shaded lanes, under overhanging banks in woodlands and quarries, in entrances of caves and quarries, in deep crevices between granite blocks or sandstone walls. It is adapted to minimum light supply and is moderately cryophytic. It prefers wet and acid substrates. It can grow on flat ground or on steep walls and slopes up to even 94° inclination (Dunk 1987; Diersen 2001). In Europe, *S. pennata* is a dominant species in communities belonging to the association *Schistostegetum osmundaceae* Giacom. 1939 in the order *Diplophylletalia albicantis* Phil. 1963 and class *Cladonio-Lepidozieta reptans* Jez. & Vondr. *emend.* Marst. 1992 (Diersen 2001).

In the Polish Carpathians, *Schistostega pennata* has so far been found only in deep sandstone crevices and on soil between roots of upturned spruce. Here it prefers a shaded, humid and acid habitat.

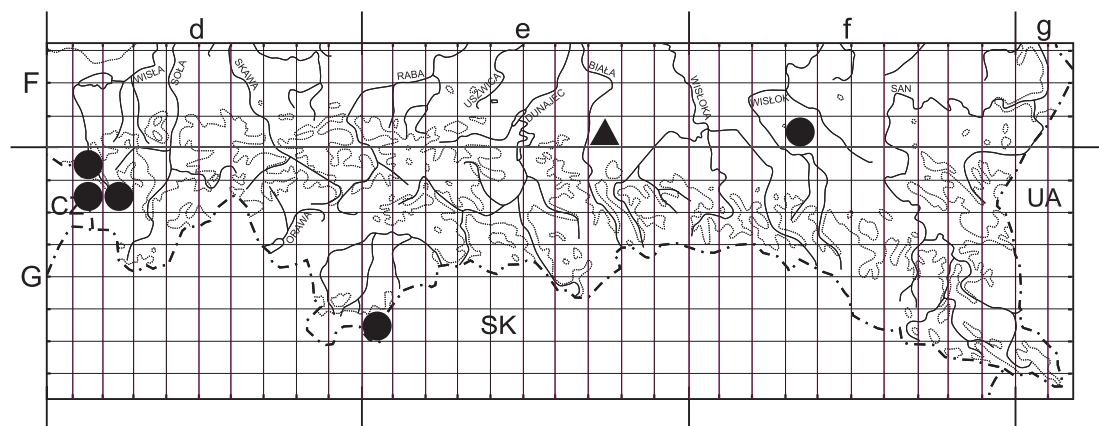


Fig. 1. Distribution of *Schistostega pennata* (Hedw.) F. Weber & D. Mohr in the Polish Carpathians. The new locality is indicated by a triangle.

At the new locality, the plants grow in cracks of a very damp, sandstone rock face in the Wąwóz Wodospad ravine near Ciężkowice in the Pogórze Ciężkowickie foothills (49°46'40"N/20°00'00"E) at alt. 367 m. The plants grow in abundance and form congeneric populations with its protonemata. *Calypogeia integristipula*, *Lepidozia reptans*, *Pogonatum aloides* and *Tetraphis pellucida* also grew in small numbers on the edge of this populations. *Schistostega pennata* was collected in this locality with young sporophytes.

Ochyra *et al.* (1988) presented a distribution map for the species in Poland and reviewed its global distribution in Europe, the Holarctic and worldwide. In Poland the species is distributed mostly in old massifs of the Variscan Orogeny (mainly in the Sudetes), and several stations are known in the Carpathians, Góry Świętokrzyskie Mts, Białowieża Forest and the Gdańsk region.

Up to now, seven localities of *Schistostega pennata* have been recorded in the Polish Carpathians (Fig. 1). It occurs at two stations in the Tatra Mts (Lisowski 1959, 1965; Ochyra *et al.* 1988), at three in the Western Beskidy Mts (Milde 1852; Szafran 1965; Ochyra *et al.* 1988; Plášek & Stebel 2002) and recently it was found in two places in the Pogórze Dynowskie foothills (Armata 2005). The presently reported station is the third one in the Polish Carpathian foothills and the eighth in the Polish Carpathians.

Because of its scarce occurrence in the Polish Carpathians, *Schistostega pennata* has been classed as rare (R) in the red list of Polish Carpathian mosses (Żarnowiec *et al.* 2004). In conterminous Slovakia it is classified as an endangered (E) moss (Kubinská & Janovicová 1998). This is probably due to the absence of rocks of the Variscan Orogeny there.

A full list of all published localities of the species known from the Polish Carpathians is presented below. Grid squares are adopted from the ATMOS cartographic system (Ochyra & Szmajda 1981, 1983).

POGÓRZE CIĘŻKOWICKIE FOOTHILLS: Grid square Fe 97 – Wąwóz Wodospad ravine near Ciężkowice, 26 km S of Tarnów, 11 April 2006, *B. Cykowska 5534* (KRAM-B).

POGÓRZE DYNOWSKIE FOOTHILLS: Ff 93 – Odrzykoń, castle hill, alt. 450 m (Armata 2005); Prządki Nature Reserve in Czarnorzeki, alt. 475 m (Armata 2005).

SILESIA BESKIDY MTS: Gd 01 – Ustroń town (Milde 1852); Gd 11 – on summit of Kobyła Mt., alt. 800 m (Szafran 1965); Gd 12 – Istebna municipality, Filipionki Mt., alt. 770–775 m (Plášek & Stebel 2002).

WESTERN TATRA MTS: Ge 50 – Toporowy Staw Wyżni lake, alt. 1125 m (Lisowski 1965). HIGH TATRA MTS: Ge 50 – Dolina Roztoki valley, at the foot of Świstówka, alt. 1450 m (Lisowski 1959).

ACKNOWLEDGEMENTS. I am very grateful to Professor Ryszard Ochyra (Kraków) for his suggestions on the paper, and to Dr. Jolanta Piątek and Dr. Marcin Piątek (Kraków) for introducing me to beautiful Wąwóz Wodospad ravine and accompanying me in the field work.

REFERENCES

- ARMATA L. 2005. A contribution to the bryoflora of the Pogórze Dynowskie Foothills (Western Carpathians). *Ann. Univ. Mariae Curie-Skłodowska, Sect. C, Biol.* **60**: 101–111.
- CORLEY M. F. V., CRUNDWELL A. C., DÜLL R., HILL M. O. & SMITH A. J. E. 1981. Mosses of Europe and the Azores: an annotated list of species, with synonyms from the recent literature. *J. Bryol.* **11** (4): 609–689.
- CROSBY M. R., MAGILL R. E., ALLEN B. & HE S. 1999. A Checklist of the Mosses. Missouri Botanical Garden, St. Louis.
- DIERSEN K. 2001. Distribution, ecological amplitude and phytosociological characterization of European bryophytes. *Bryophyt. Biblioth.* **56**: 1–289.
- DUNK K. von der 1987. Zur Ökologie von *Schistostega pennata*. *Herzogia* **7**(3–4): 593–600.
- KUBINSKÁ A. & JANOVICOVÁ K. 1998. Bryophytes. In: K. MARHOLD & F. HINDÁK (eds), *Checklist of non-vascular and vascular plants of Slovakia*, pp. 297–331. Veda, Bratislava.
- LISOWSKI S. 1959. Materials to the bryoflora of the Tatra Mountains. *Prace Komis. Biol.* **21**(2): 21–149 + 2 maps (in Polish with English summary).
- LISOWSKI S. 1965. Matériaux bryologiques des Tatras. *Bull. Soc. Amis Sci. Lett. Poznań, Ser. D, Sci. Biol.* **6**: 123–146.
- MILDE J. 1852. Zur Flora von Ustron bei Teschen. *Bot. Zeitung* **10**(41): 715–717.
- OCHYRA R. & SZMAJDA P. 1981. La cartographie bryologique en Pologne. In: J. SZWEYKOWSKI (ed.), *New perspectives in bryotaxonomy and bryogeography*. Uniwersytet im. Adama Mickiewicza w Poznaniu, *Seria Biologia* **20**: 105–110.

- OCHYRA R. & SZMAJDA P. 1983. Editorial note. In: Z. TOBOLEWSKI & T. WOJTERSKI (eds), *Atlas of the geographical distribution of spore plants in Poland. Series V. Mosses (Musci)*. 1: 7–9. Państwowe Wydawnictwo Naukowe, Warszawa – Poznań.
- OCHYRA R., ŻARNOWIEC J. & BEDNAREK-OCHYRA H. 2003. Census catalogue of Polish mosses. Institute of Botany, Polish Academy of Sciences, Kraków.
- OCHYRA R., SZMAJDA P., BOCHEŃSKI W. & KARZMARZ K. 1988. M. 297. *Schistostega pennata* (Hedw.) Web. et Mohr. In: Z. TOBOLEWSKI & T. WOJTERSKI (eds), *Atlas of the geographical distribution of spore plants in Poland. Series V. Mosses (Musci)*. 4: 15–17 + 1 map. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków and Adam Mickiewicz University, Poznań.
- PLÁŠEK V. & STEBEL A. 2002. Bryophytes of the Čantoryjský hřbet range (Czantoria range) and its foothills (Western Carpathians – Czech Republic, Poland). *Čas. Slez. Muz. Opava, Ser. A* 51: 1–87.
- SZAFRAN B. 1965. Mchy Beskidu Śląskiego i Małego. *Fragm. Florist. Geobot.* 5: 607–630.
- ŻARNOWIEC J., STEBEL A. & OCHYRA R. 2004. Threatened moss species in the Polish Carpathians in the light of a new Red-list of mosses in Poland. In: A. STEBEL & R. OCHYRA (eds), *Bryological studies in the Western Carpathians*, pp. 9–28. Sorus, Poznań.

Received 8 September 2006

***DIPLOTOMMA SCHEIDEGGERIANUM* (LECANORALES, ASCOMYCOTA), A LICHENICOLOUS LICHEN NEW TO POLAND**

KARINA WILK

Karina Wilk, Laboratory of Lichenology, W. Szafer Institute of Botany, Polish Academy of Sciences, Lubicz 46, PL-31-512 Kraków, Poland; e-mail: ibpalka@ib-pan.krakow.pl

In 2004, during a survey focused on the calcicolous species of the genus *Caloplaca* Th. Fr. in the Polish Tatra Mts, I found the lichenicolous species *Diplotomma scheideggerianum* (Bricaud & Cl. Roux) Nimis growing on the thalli of *Caloplaca xantholyta* (Nyl.) Jatta. It emerged that it is the first record of *D. scheideggerianum* from Poland.

The species *D. scheideggerianum* was described from France by Bricaud and Roux (1991) as an obligatory parasitic fungus occupying leprose thalli of *C. xantholyta*. Then the species was additionally reported from the thallus of *C. chrysodeta* (Vain. ex Räsänen) Dombr., which is another leprose lichen species, very similar to *C. xantholyta* (Etayo *et al.* 1993). The authors also noted that *D. scheideggerianum* can be found directly on the rock surface. *Diplotomma scheideggerianum* is a rarely collected lichen known from only a few localities in Europe, mainly in the Mediterranean region (Nordin 2000) including France, Greece, Slovenia (Bricaud & Roux 1991) and Italy (Nimis 1993; Tretiach & Carvalho 1993). It was also reported from Austria (Poelt 1994) and from near the Atlantic coast in Spain (Etayo *et al.* 1993).

The examined specimen of *D. scheideggerianum* is characterized by small, black and white-pruinose apothecia, 0.2–0.6 mm in diameter. They are immersed to sessile, numerous and concentrated in bleached areas located mostly in the very center of *C. xantholyta* thalli. The apothecial discs are flat to subglobose and surrounded by a thin proper margin, which is absent when the apothecia are strongly convex. The parathecium is brown, paraplectenchymatous and consisting of

large hyphal cells *ca* 3 μm wide. The epihymenium is interspersed with brown granules; the hymenium is hyaline and 60–90 μm high; the hypothecium is dark brown with oil drops and 80–100 μm high. The mature ascospores are brown, one to three-septate to weakly submuriform, 10–15 \times 6–8 μm ; 8 spores occur in each ascus. In cross section the apothecia are not colored by C, K, Pd. The only positive reaction of the apothecia is the J+ blue reaction of the hymenium.

The collected specimen of *D. scheideggerianum* is abundant and well developed. It was found on a vertical limestone wall in a shaded and humid situation, accompanied by *Caloplaca cirrochroa* (Ach.) Th. Fr. *Diplotomma scheideggerianum* prefers only humid sites, in contrast to its hosts (*C. chrysodeta* and *C. xantholyta*), which have a wider ecological amplitude and occur also in less humid places (Nordin 2000). The species was reported as occurring in the *Caloplaca xantholyta* association by Bricaud and Roux (1991) and subsequently also by Roux and Gueidan (2002).

Morphologically, *Diplotomma scheideggerianum* most resembles *D. alboatrum* (Hoffm.) Flot. The latter, however, has a distinct, crustose, continuous thallus and larger spores (13–20 \times 6.5–10 μm). Additionally, *D. alboatrum* is predominantly a saxicolous lichen, and only young thalli may temporarily parasitize other lichens (Nordin 2000).

SPECIMEN EXAMINED. POLAND. WESTERN CARPATHIANS: West Tatra Mts, Wąwóz Kraków gorge, alt. 1100 m, on vertical limestone wall, NE exposition, in humid and shaded situation, 15 July 2004, *K. Wilk 2132* (KRAM).

ACKNOWLEDGEMENTS. I am grateful to the anonymous reviewer for useful suggestions on the manuscript.

REFERENCES

- BRICAUD O. & ROUX C. 1991. *Buellia scheideggeriana* Bricaud et Roux sp. nov., espèce nouvelle de lichen. *Nova Hedwigia* **52**(1–2): 161–172.
- ETAYO J., AGUIRRE B. & DIDERICH P. 1993. Interesting or new lichens from the Atlantic Pyrenees and the north of the Iberian Peninsula. II. *Nova Hedwigia* **57**(1–2): 179–194.
- NIMIS P. L. 1993. The lichens of Italy. An annotated catalogue. *Museo Regionale di Scienze Naturali, Torino, Monogr.* **12**: 1–897.
- NORDIN A. 2000. Taxonomy and phylogeny of *Buellia* species with pluriseptate spores (Lecanorales, Ascomycotina). *Symb. Bot. Upsal.* **33**(1): 1–117.
- POELT J. 1994. Bemerkenswerte Flechten aus Österreich, insbesondere der Steiermark. *Mitt. Naturwiss. Vereins Steiermark* **124**: 91–111.
- ROUX C. & GUEIDAN C. 2002. Flore et végétation des lichens et champignons lichénicoles non lichénisés du massif de la Sainte-Baume (Var, Provence, France). *Bull. Soc. Linn. Provence* **53**: 123–150.
- TRETIACH M. & CARVALHO P. 1993. Four lichens new to Italy. *Studia Geobotanica* **13**: 349–356.

Received 31 August 2006

CLADONIA BOREALIS (CLADONIACEAE, LICHENIZED ASCOMYCOTA) IN THE POLISH CARPATHIANS

PIOTR OSYCZKA

Piotr Osyczka, Department of Polar Research and Documentation, Institute of Botany, Jagiellonian University, Kopernika 27, PL-31-501 Kraków, Poland; e-mail: osyczka@ib.uj.edu.pl

During a critical revision of lichen materials belonging to *Cladonia coccifera* s.l. deposited in KRA (Institute of Botany, Jagiellonian University) and KRAM-L (W. Szafer Institute of Botany, Polish Academy of Sciences), some specimens were found to refer to *Cladonia borealis* S. Stenroos. As a result of this examination, the species was ascertained in the Polish Tatra Mts, Beskid Sądecki Mts and Beskid Żywiecki Mts. The species is reported here for the first time for those mountain ranges.

Cladonia borealis is a representative of the section *Cocciferae* (Delise) A. Evans. The section is known for its many red-fruited lichen species. *Cladonia borealis* was separated and described from the *C. coccifera* group by Stenroos (1989). It is a cup-shaped, relatively short-podetiate lichen with usually wide and gradually expanded scyphi. The species has persistent and rather large primary squamules up to 10 mm long, green above and whitish below, with usually dark yellow or orange tint at the base. Podetia are up to 2.5–3 cm tall and usually simple. The surface of the podetia is esorediate, in the upper parts covered by rounded cortical plates (also inside cups), areolate to continuously corticate at the base. The basal parts of podetia are often slightly rugulose and sparsely squamulose. Podetia are greenish in places covered by cortex, and whitish or yellowish in decorticate areas. Red apothecia are often produced and are sedentary on the cup margins. The thallus contains usnic and barbatic acids, and 4-O-demethylbarbatic acid as an accessory substance. According to Stenroos (1989), some fatty acids may be present.

Cladonia borealis is a cosmopolitan lichen, circumpolar in the Northern Hemisphere, and common and widespread especially in the boreal and arctic zones (e.g., Randlane & Saag 1999; Ahti 2000; Osyczka 2003, 2005; Santesson *et al.* 2004). In Central Europe it occurs mostly in mountain regions (Wirth 1995). It prefers rather open habitats, growing on mineral and stony soil and often on mosses or humus.

Morphologically, *C. borealis* is most closely related to *C. coccifera* (L.) Willd. The podetia surface is plated in both species; the plates are flat in *C. borealis* and scaly in *C. coccifera*. *C. borealis* also is frequently more corticated. Chemically, *C. coccifera* contains, besides usnic acid, zeorin rather than barbatic acid. The most reliable way to distinguish *C. borealis* from *C. coccifera* is chemical analysis, especially for juvenile specimens or those deformed by severe climatic conditions.

Based on older and recent herbarium materials, *C. borealis* has been ascertained at four localities in the Tatra Mts, two in the Beskid Sądecki Mts, and two in the Beskid Żywiecki Mts (Fig. 1). All these records were confirmed by chemical analysis by the standard TLC method (after Orange *et al.* 2001). Earlier the species was reported from the Beskid Niski Mts (Polakowska 2002; Fałtynowicz 2003), but this record is incorrect. The small critical specimen of this collection has soredia and contains squamatic acid, and thus cannot belong to *C. borealis*. In Poland the lichen was also reported from the Bory Tucholskie forest (Lipnicki 2003); that report needs confirmation. Detailed information about the examined individuals of *C. borealis* from the Polish Carpathians is provided below.

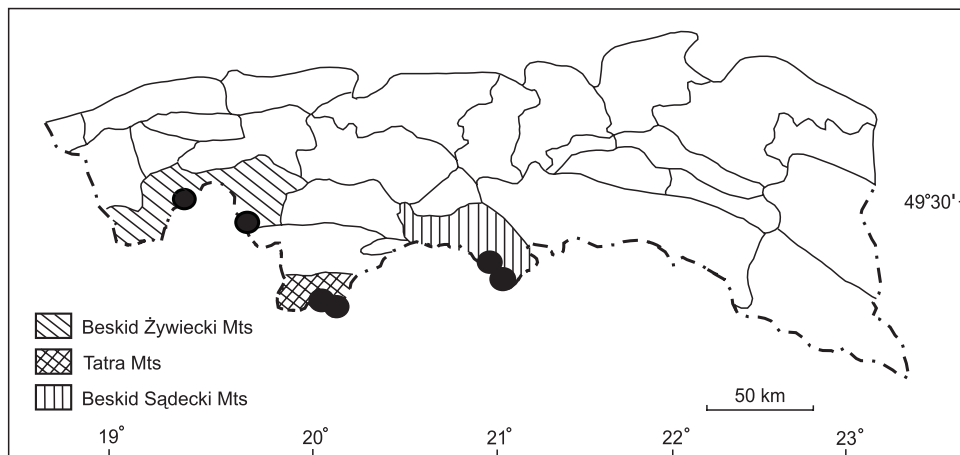


Fig. 1. Distribution of *Cladonia borealis* S. Stenroos in the Polish Carpathians (physicogeographical division of the Polish Carpathians after Kondracki 2000).

From the other parts of the Western Carpathians, localities of *C. borealis* have been published only from the High Tatras (Tatry Wysokie Mts) on the Slovak side (Aptroot *et al.* 2003; Bielczyk *et al.* 2004; Lisická 2005). In the Eastern Carpathians the species has not been observed so far (Kon-dratyuk 2003).

SPECIMENS EXAMINED. POLAND. WESTERN CARPATHIANS. TATRY WYSOKIE MTS: Hińczowy Żleb gully, below Hińczowa Przełęcz pass, alt. 2250 m, NE aspect, slope 5°, subnival belt, mylonite area, on soil rich in humous among bryophytes, 17 Aug. 2003, *leg. A. Flakus 2023* (KRAM-L); Zawrat pass, alt. 2150 m, NW aspect, slope 0°, subnival belt, mylonite area, on humus among mosses, 18 Aug. 2004, *leg. A. Flakus 3250 & 3263* (KRAM-L); Cubryna Mt., alt. 2370 m, subnival belt, on humus, 1 Aug. 2003, *leg. A. Flakus 1022* (KRAM-L); Ciemnosmreczyńska Przełęczka pass, alt. 2105 m, N aspect, subnival belt, mylonite area, on soil rich in humous, 24 July 2004, *leg. A. Flakus 2894* (KRAM-L). **BESKID SADECKI MTS:** Pasma Jaworzyny range, Dolina Potoku Szczawnik valley, alt. 650 m, on soil in rocky crevice, 26 July 1967, *leg. M. Olech* (KRA); Pasma Jaworzyny range, Dolina Potoku Żegiestowskiego valley, alt. 600 m, on stony soil, 22 Aug. 1967, *leg. M. Olech* (KRA); **BESKID ŻYWIECKI MTS:** region of Pilsko Mt., above Potok Loraniec stream, alt. 480 m, on soil rich in humous among mosses, 27 Sep. 1966, *leg. J. Nowak* (KRAM-L 17738); near Bucznik Mt., alt. 670 m, on soil rich in humous, 27 Oct. 1967, *leg. J. Nowak* (KRAM-L 19412).

ACKNOWLEDGEMENTS. I am grateful to my colleagues Adam Flakus and Michał Wegrzyn for providing access to their recent lichen collections of the *Cladonia coccifera* group from the Polish Tatra Mts, Dr. Urszula Bielczyk (Kraków), Curator of KRAM-L, for the loan of selected lichen materials from the herbarium, and the anonymous reviewer for valuable comments on the manuscript.

REFERENCES

- AHTI T. 2000. Cladoniaceae. Flora Neotropica Monograph 78. New York Botanical Garden, New York.
- APTRoot A., LISICKÁ E. & PACLOVÁ L. 2003. *Cladonia borealis*, *C. monomorpha* and *Physcia vitii* (lichenized Ascomycota), new to Slovakia. *Biologia (Bratislava)* **58**(4): 767–771.
- BIELCZYK U., LACKOVIČOVÁ A., FARKAS E. E., LÖKÖS L., LIŠKA J., BREUSS O. & KONDRATYUK S. Y. 2004. Checklist of lichens of the Western Carpathians. In: Z. MIREK (ed.), *Biodiversity of the Carpathians* **1**: 5–181. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.
- FAŁTYNOWICZ W. 2003. The lichens, lichenicolous and allied fungi of Poland. An annotated checklist. Biodiversity of Poland **6**. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.
- KONDRACKI J. 2000. Geografia regionalna Polski. Wydawnictwo Naukowe PWN, Warszawa.
- KONDRATYUK S. Y., POPOVA L. P., LACKOVIČOVÁ A. & PIŠŮT I. 2003. A catalogue of Eastern Carpathian Lichen. M. H. Kholodny Institute of Botany, Kiev-Bratislava.

- LIPNICKI L. 2003. Porosty Borów Tucholskich. Park Narodowy "Bory Tucholskie", Charzykowy.
- LISICKÁ E. 2005. The Lichens of the Tatra Mountains. Veda, the Publishing House of the Slovak Academy of Sciences, Bratislava.
- ORANGE A., JAMES P. W., WHITE F. J. 2001. Microchemical methods for the identification of lichens. British Lichen Society, London.
- OSYCZKA P. 2003. Gatunki rodzaju *Cladonia* Hill ex Browne w rejonie Spitsbergenu (Arktyka) – chemotaksonomia i rozmieszczenie. PhD thesis, Department of Polar Research and Documentation, Institute of Botany, Jagiellonian University, Kraków.
- OSYCZKA P. 2005. A note about new and rarely reported taxa of the genus *Cladonia* from the Arctic island Spitsbergen (Svalbard). *Acta Soc. Bot. Poloniae* **74**(3): 243–246.
- POLAKOWSKA A. 2002. Porosty i grzyby naporostowe "Diabłego Kamienia" i doliny potoku Folsz w Beskidzie Niskim. Praca magisterska wykonana w Katedrze Taksonomii Roślin i Ochrony Przyrody Uniwersytetu Gdańskiego, Gdańsk.
- RANDLANE T. & SAAG A. (eds) 1999. Second checklist of lichenized, lichenicolous and allied fungi of Estonia. *Folia Cryptogamica Estonica* **35**: 1–132.
- SANTESSON R., MOBERG R., NORDIN A., TRNSBERG T. & VIKKAINEN O. 2004. Lichen-forming and lichenicolous fungi of Fennoscandia. Museum of Evolution, Uppsala University, Uppsala.
- STENROOS S. 1989. Taxonomy of the *Cladonia coccifera* group. 1. *Ann. Bot. Fenn.* **26**: 157–168.
- WIRTH V. 1995. Die Flechten Baden-Württembergs. Teil 1. Verlag E. Ulmer, Stuttgart.

Received 22 November 2005

TWO SPECIES OF THE GENUS *CLADONIA* (CLADONIACEAE, LICHENIZED ASCOMYCOTA) NEW TO THE POLISH TATRA MTS

PIOTR OSYCZKA, MICHAŁ WĘGRZYN & ADAM FLAKUS

Piotr Osyczka & Michał Węgrzyn, Department of Polar Research and Documentation, Institute of Botany, Jagiellonian University, Kopernika 27, PL-31-501 Kraków, Poland; e-mail: osyczka@ib.uj.edu.pl, wegrzyn@ib.uj.edu.pl
Adam Flakus, Laboratory of Lichenology, W. Szafer Institute of Botany, Polish Academy of Sciences, Lubicz 46, PL-31-512 Kraków, Poland; e-mail: ibflakus@ib-pan.krakow.pl

Two new lichen species of the genus *Cladonia* Hill ex P. Browne were recognized in the Polish part of the Tatra Mts: *C. metacorallifera* Asahina and *C. ramulosa* (With.) J. R. Laundon.

Cladonia metacorallifera is a member of the section *Cocciferae* (Delise) A. Evans, well-known for its many red-fruited lichens of *Cladonia*. Morphologically it is very similar to *C. coccifera* (L.) Willd. but the cups are usually visibly tapered and decorated by many small squamules which give the podetia a ragged appearance. The podetia are largely covered by squamules and granules.

Parts of the podetia have blackened and decorticated areas, especially towards the margins of the cups. The species produces usnic, squamatic and didymic acids in the typical chemotype. Another chemical strain (known as var. *reagens* Asahina) contains thamnolic acid instead of squamatic acid. Chemical analysis prevents confusion *C. metacorallifera* with *C. coccifera* (contains zeorin and usnic acid) or *C. borealis* S. Stenroos (contains barbatic and usnic acids). It is rather an acidophilous lichen, appearing mainly on soils with a thin humus layer and on mossy rocks.

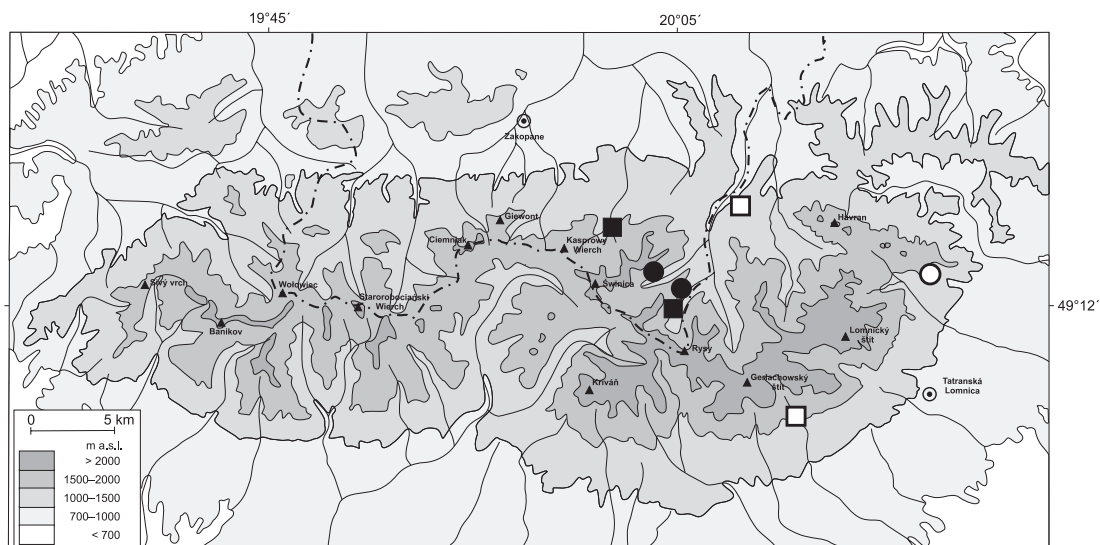


Fig. 1. Currently known localities of *Cladonia metacorallifera* Asahina and *Cladonia ramulosa* (With.) J. R. Laundon in the Tatra Mts: □ – localities of *C. metacorallifera* known from literature, ■ – new localities of *C. metacorallifera*, ○ – locality of *C. ramulosa* known from literature, ● – new localities of *C. ramulosa*.

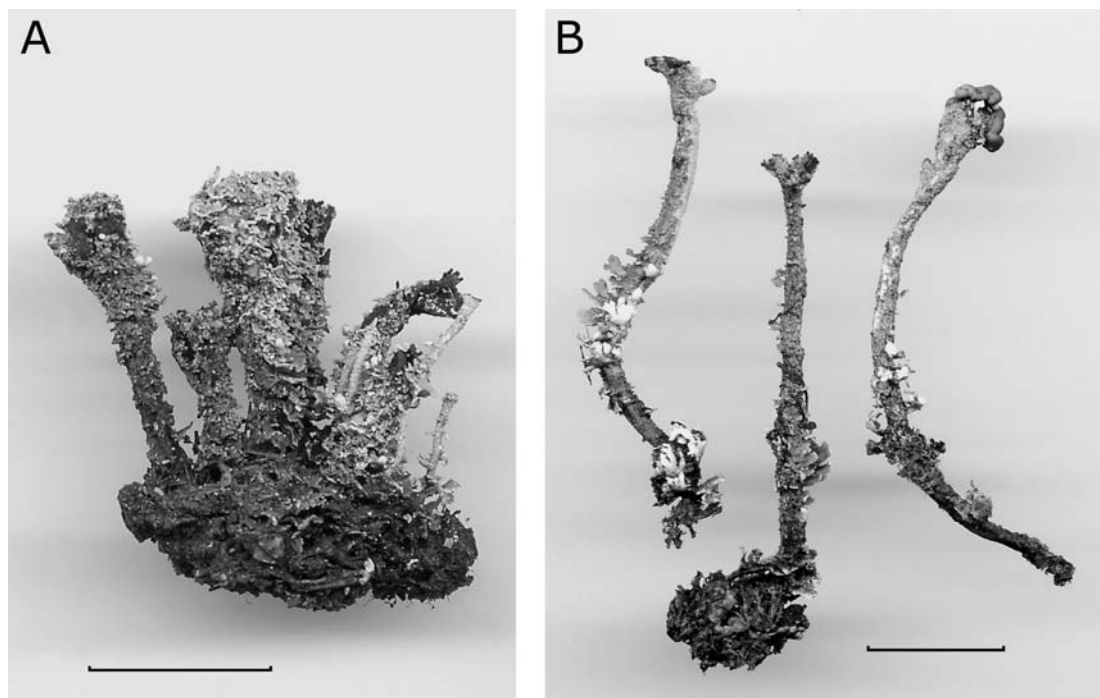


Fig. 2. Specimens of *Cladonia metacorallifera* Asahina (A) and *Cladonia ramulosa* (With.) J. R. Laundon (B) from the Polish part of the Tatra Mts. Scale bars = 1 cm. A – A. Flakus 30,1 (KRAM-L); B – M. Węgrzyn 2446 (KRA).

Cladonia metacorallifera was described by Asahina (1939) from Japan. Currently it is known also from Europe, North and South America (e.g., Tønsberg 1975; Purvis & James 1992; Esslinger & Egan 1995; Pišút 1997; Vitikainen *et al.* 1997; Randlane & Saag 1999; Scholz 2000; Hafellner & Türk 2001; Santesson *et al.* 2004). In Europe the species occurs in the boreal and temperate zones, especially in high mountain and alpine belts (Wirth 1995). In the Western Carpathians it was reported from the Slovak part of the High Tatra Mts (Fig. 1) (Pišút 1997; Kowalewska & Kukwa 2004).

The first and so far only record of *C. metacorallifera* in Poland was published from the Sudety Mts, in the Karkonoski National Park (Kowalewska & Kukwa 2004). At present, two specimens of the species were recognized from the Tatra Mts (Fig. 1). The first one was determined from a detailed taxonomical revision of a historical specimen housed in the herbarium of the W. Szafer Institute of Botany, Polish Academy of Sciences

(KRAM-L). It was gathered by W. Augustynowicz in 1912. The label attached to the specimen unfortunately does not contain precise information about the locality. It was only marked that the specimen was collected in the Dolina Gašienicowa valley region. Certainly the lichen overgrew soil rich in humous. The second specimen of *C. metacorallifera* (Fig. 2A) was collected during field work done in 2002. It was found in the upper montane belt on a granite boulder covered by a layer of humus, and was associated with *C. bellidiflora* (Ach.) Schaer. and *C. pleurota* (Flörke) Schaer. Both of the examined specimens belong to the chemotype with squamatic acid.

SPECIMENS EXAMINED. SOUTHERN POLAND. WESTERN CARPATHIANS, HIGH TATRA MTS: Dolina Rybiego Potoku valley [49°13'N/20°05'E], upper montane belt, alt. 1350 m, granite boulder by stream, on humus, 11 Aug. 2002, A. Flakus 30/1 (KRAM-L); Dolina Gašienicowa valley, Hala Gašienicowa, 22 Aug. 1912, W. Augustynowicz (KRAM-L 20411).

Cladonia ramulosa, a representative of the section *Cladonia*, is extremely variable in form. Most typically it has contorted, irregularly branched, more or less pointed podetia. The surface of podetia is covered by granular soredia and partly ornamented by various squamules or microsquamules. Soredia and squamules are usually mixed together. Pale brown and contiguous apothecia are frequently produced at the tips of podetia. The primary squamules are sometimes reduced to a granular crust. The thallus contains fumarprotocetraric acid. The lichen inhabits mainly soil, decaying wood and mossy rocks in rather moist and shaded situations. The huge variability of *C. ramulosa* causes it to be easily overlooked or mistakenly determined. The species may resemble especially *C. ochrochlora* and *C. subulata*, which have similar chemistry but are covered by mealy or powdery soredia. *C. ochrochlora* also has a more continuous cortex on the lower half.

Cladonia ramulosa has been reported from almost every continent (e.g., Purvis & James 1992). In Europe its range covers the south part of the boreal zone, temperate zone, sub-Atlantic, sub-Mediterranean and Mediterranean regions (Nimis 1993; Wirth 1995). From the Western Carpathian area, besides Poland the species was also noted in the Czech Republic, Slovakia and Hungary (see Bielczyk *et al.* 2004). From the Tatras it was reported only from the Belianske Tatry Mts in Slovakia so far (Fig. 1) (Hadač *et al.* 1969). Currently two localities of the species were ascertained in the Polish part of the High Tatra Mts (Figs 1 & 2B).

SPECIMENS EXAMINED. SOUTHERN POLAND. WESTERN CARPATHIANS, HIGH TATRA MTS: Dolina Roztoki valley [49°13'N/20°03'E], alt. 1350 m, on soil among bryophytes, 30 July 2005, *M. Węgrzyn 2427* and *2446* (KRA); Dolina Rybiego Potoku valley [49°13'N/20°05'E], upper montane belt, alt. 1230 m, on decaying wood, 12 Aug. 2002, *A. Flakus 42* (KRAM-L).

ACKNOWLEDGEMENTS. We are very grateful to Professor Teuvo Ahti (Helsinki) for indicating one specimen of *C. metacorrallifera* in our material, Dr. Urszula Bielczyk (Kraków), Curator of KRAM-L, for the loan of selected lichen materials from the herbarium, and to the anonymous reviewer for helpful comments on the manuscript.

REFERENCES

- ASAHINA Y. 1939. Japanische Arten der Cocciferaceae (*Cladonia*-Coenomyce). *J. Jap. Bot.* **15**: 602–620.
- BIELCZYK U., LACKOVIČOVÁ A., FARKAS E. E., LÖKÖS L., LIŠKA J., BREUSS O. & KONDRATYUK S. Y. 2004. Checklist of lichens of the Western Carpathians. *Biodiversity of the Carpathians* **1**: 5–181. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.
- ESSLINGER T. L. & EGAN R. S. 1995. A sixth checklist of lichen-forming, lichenicolous and allied fungi of the United States and Canada. *Bryologist* **98**: 467–549.
- HADAČ E., BŘEZINA P., JEŽEK V., KUBIČKA J., HADAČOVÁ V. & VONDRÁČEK M. 1969. Die Pflanzengesellschaften des Tales 'Dolina Siedmich prameňov' in der Belaer Tatra. *Vegetácia ČSSR* B2, Bratislava.
- HAFELLNER J. & TÜRK R. 2001. Die licheniserten Pilze Österreich – eine Checkliste der bisher nachgewiesenen Arten mit Verbreitungangaben. *Stappia* **76**: 3–167.
- KOWALEWSKA A. & KUKWA M. 2004. *Cladonia metacorrallifera* (lichenized Ascomycota, Cladoniaceae) new to Poland and additional record from Slovakia. *Biologia (Bratislava)* **59**(4): 433–434.
- NIMIS P. L. 1993. The Lichens of Italy. An annotated catalogue. Museo Regionale di Scienze Naturali, Torino.
- PIŠŮT I. 1997. Interessantere Flechtenfunde aus der Slowakei 4. *Bulletin Slovenskej Botanickéj Spoločnosti, Bratislava* **19**: 68–71 (in German with Slovak abstract).
- PURVIS O. & JAMES P. W. 1992. *Cladonia* Hill ex Browne (1756). In: O. W. PURVIS, B. J. COPPINS, D. L. HAWKSWORTH, P. W. JAMES, & D. M. MOORE (eds), *The Lichen Flora of Great Britain and Ireland*, pp. 188–210. Natural History Museum Publications, London.
- RANLANE T. & SAAG A. (eds) 1999. Second checklist of lichenized, lichenicolous and allied fungi of Estonia. *Folia Cryptogamica Estonica* **35**: 1–132.
- SANTESSON R., MOBERG R., NORDIN A., TØNSBERG T. & VITIKAINEN O. 2004. Lichen-forming and lichenicolous fungi of Fennoscandia. Museum of Evolution, Uppsala University, Uppsala.
- SCHOLZ P. 2000. Katalog der Flechten und flechtenbewohnenden Pilze Deutschland. *Schriftenreihe für Vegetationskunde* **31**: 1–298.
- TØNSBERG T. 1975. *Cladonia metacorrallifera* new to Europe. *Norveg. J. Bot.* **22**: 129–132.
- VITIKAINEN O., AHTI T., KUUSINEN M., LOMMI S. & ULVINEN T. 1997. Checklist of lichens and allied fungi of Finland. *Norrinia* **6**: 1–123.
- WIRTH V. 1995. Die Flechten Baden-Württembergs. Verlag E. Ulmer, Stuttgart.