

FOUR SPECIES OF *CALOPLACA* S.L. (LICHENIZED ASCOMYCOTA, TELOSCHISTACEAE) NEW FOR POLAND

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Abstract. Four calcicolous species of the genus *Caloplaca* s.l., *C. concreticola* Vondrák & Khodosovtsev, *C. interfulgens* (Nyl.) J. Steiner, *C. isidiigera* Vězda and *C. scabrosa* Söchting, Lorentsen & Arup, representing various taxonomic groups, are reported as new for Poland, with brief taxonomic remarks and information on their habitat and distribution given.

Key words: biodiversity, Carpathians, distribution, mountains, *Pyrenodesmia*, taxonomy, *Xanthocarpia*

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INTRODUCTION

The lichen genus *Caloplaca* s.l. is represented by 76 species in Poland (Wilk 2012; Szczepeńska *et al.* 2013). Recent studies of calcicolous representatives of the genus from the Polish Carpathians have recognized several species new for Poland (Wilk & Flakus 2006; Wilk 2011, 2012; Wilk & Śliwa 2012). Four more calcicolous species of *Caloplaca* s.l. new for the country are presented here: *C. concreticola* Vondrák & Khodosovtsev, *C. interfulgens* (Nyl.) J. Steiner, *C. isidiigera* Vězda and *C. scabrosa* Söchting, Lorentsen & Arup. They belong to different systematic groups: respectively, brown-black fruiting *Caloplaca* species, *C. lactea* gr., *C. cerina* gr., and *C. crenularia* gr. Brief taxonomic remarks and data on their habitat preferences and distribution are given.

MATERIAL AND METHODS

Material obtained from KRAM, KTC and the herbarium of Gorce National Park (GPN) was examined. Reference material from CBFs, KRAM, VU and MIN, including types, was consulted.

Morphology and anatomy were observed by standard techniques. Anatomical characters were measured from hand-cut sections and squash preparations mounted in water. Tissue granulation was observed under polarized light. The solubility of granules and/or crystals

was tested with 25% KOH (K) and 65% nitric acid (N). K and N were used for color reactions and microscopy.

NOMENCLATURE. According to the most recent classification of *Teloschistaceae* (Arup *et al.* 2013), the recognized species belong to the following genera: *Pyrenodesmia* A. Massal. (*C. concreticola* Vondrák & Khodosovtsev), *Xanthocarpia* A. Massal. & D. Not. [*C. interfulgens* (Nyl.) J. Steiner] and *Caloplaca* Th. Fr. *s.str.* (*C. isidiigera* Vězda). For *C. scabrosa* Söchting, Lorentsen & Arup and some of the other discussed species, however, there are no appropriate new combinations provided. Therefore, the traditional names for all these species were followed in this paper.

THE SPECIES

Caloplaca concreticola Vondrák & Khodosovtsev
 Fig. 1

Lichenologist **40**(2): 98. 2008.

This inconspicuous species has brown apothecia and a greyish areolate thallus. The areoles are flat and produce marginal bluish-grey soralia. The species is very similar to *C. atroalba* (Tuck.) Zahlbr. (for detailed description see Wilk 2011) but the latter has a slightly smaller, esorediate thallus, and its thalline cortex reacts violet with K due to

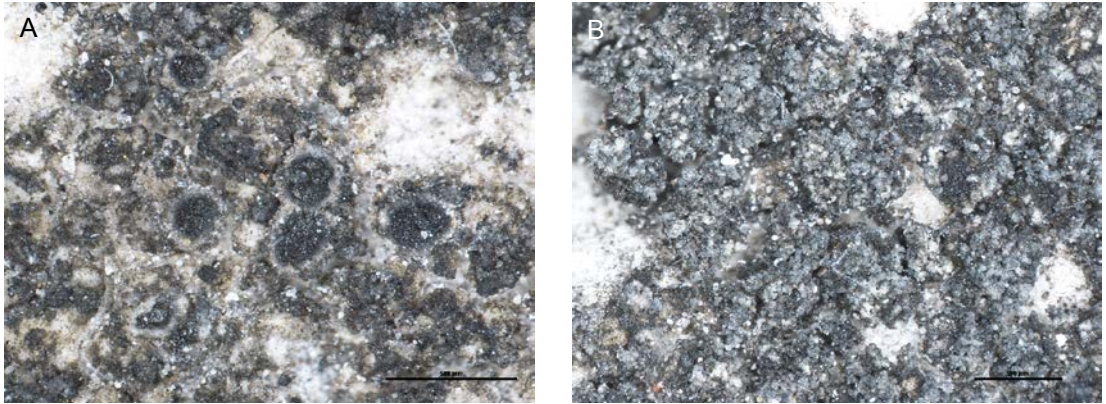


Fig. 1. *Caloplaca concreticola* Vondrák & Khodosovtsev (*I. Wroclawska & K. Toborowicz s.n.*, KTC). A – thallus with apothecia, B – thallus with abundant soredia. Scale bars: A & B = 0.5 mm.

the presence of Sedifolia-grey pigment (the reaction is negative in *C. concreticola*). When sterile, *C. concreticola* can be confused with *C. soralifera* Vondrák & Hrouzek, but the thalline cortex of the latter reacts violet with K, similarly to *C. atroalba* (Vondrák *et al.* 2008a). Finally, *C. pratensis* Wetmore also is very similar to *C. concreticola* but differs in having convex areoles and soredia mostly on the upper surface of the areoles, and is known only from North America (Wetmore 2009). For a comparison with several other species see Vondrák *et al.* (2008a).

Caloplaca concreticola is known from Eastern and Central Europe and was recorded in Ukraine, Romania and Slovakia (Vondrák *et al.* 2008a). Most recently it was reported from Russia (Vondrák 2012), the Czech Republic, Asia (Kazakhstan) and also North America (USA) (Frolov & Vondrák 2012; no exact localities are provided). The species occurs in dry, steppe and xerothermic habitats. It occupies anthropogenic substrates (e.g., concrete) as well as natural rocky substrates (calcareous sandstone).

In Poland the species was found in the Góry Świętokrzyskie Mts, where it grew on limestone among xerothermic vegetation.

SPECIMEN EXAMINED. POLAND. Góry ŚWIĘTOKRZYSKIE MTS. Łysogórski district, Łagów, on limestone, 2 Aug. 1980, *I. Wroclawska & K. Toborowicz s.n.* (KTC).

REFERENCE MATERIAL EXAMINED. *Caloplaca concreticola*: UKRAINE. KHERSONSKA OBLAST, CHAPLINSKIY

DISTRINCT, ca 4.5 km W of Zaozerne village, Kakhovskiy water channel, alt. ca 30 m, 7 June 2006, *J. Vondrák & J. Šoun* (CBFS JV4636-holotype). *Caloplaca pratensis*: USA. NORTH DAKOTA, Olivier Co., The Nature Conservancy's Cross Ranch Preserve, Sangor Ghost Town, alt. 515 m, on old concrete foundation, 5 June 2007, *M. K. Advita 6100* (MIN – holotype; Wetmore, *Telos. Exsicc.* 113, KRAM – isotype).

***Caloplaca interfulgens* (Nyl.) J. Steiner** Fig. 2
Verhandl. Zool.-Bot. Gessellsch. Wien 52: 479. 1902.

The species is a member of the *C. lactea* group (Navarro-Rosinés & Hladun 1996). It is a distinctive taxon having a yellow, well developed areolate to subsquamulose thallus. The species is similar

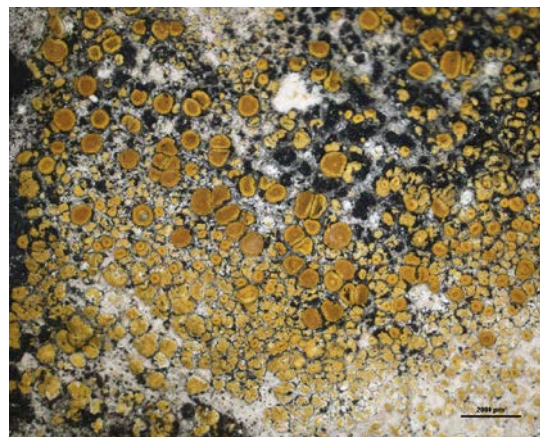


Fig. 2. *Caloplaca interfulgens* (Nyl.) J. Steiner (*K. Wilk 3493*, KRAM). Scale bar = 2 mm.

to *C. crenulatella* (Nyl.) H. Olivier but the latter has a less developed or even endolithic thallus producing no subsquamules at all. Moreover, the apothecia of *C. crenulatella* vary in color depending on the development stage (young apothecia are citrine-yellow; the old ones are dull yellow to orange), whereas in *C. interfulgens* the apothecia are uniformly orange (Navarro-Rosinés & Hladun 1996). The recently described *C. diffusa* Vondrák & Llimona is very similar to *C. interfulgens* but differs from the latter in having an areolate thallus with a diffuse margin and a white or grey prothallus, and it occurs on siliceous rock (Vondrák *et al.* 2011).

In all examined specimens of *C. interfulgens* I observed a very well-developed thalline margin of the apothecia, whereas in the species description by Navarro-Rosinés and Hladun (1996) the thalline margin is specified as not macroscopically differentiated.

The species is known from the Mediterranean region, Middle East and Central Asia. Most recently it was also reported from Central and Eastern Europe. For its detailed distribution see Vondrák *et al.* (2013). The species occurs in desert, steppe and xerothermic habitats, occupying limestone rock (Navarro-Rosinés & Hladun 1996; Vondrák *et al.* 2013).

In Poland the species is known from the Tatras and the Pieniny Mts, where it has been found on limestone in xerothermic habitats.

SPECIMENS EXAMINED. POLAND. WESTERN CARPATHIANS. WESTERN TATRA MTS, Dolina Chochołowska valley, Polana Chochołowska glade, alt. 1140 m, on limestone rock, 1 Dec. 1995, *J. Nowak s.n.* (KRAM). PIENINY SPISKIE MTS, Pieniny National Park, Zielone Skałki range by Jezioro Czorsztyńskie lake, NE of Falsztyn, 49°25'56"N, 20°17'35"E, alt. 588 m, uppermost part of limestone outcrops, sunny place, 6 June 2005 & 12 Nov. 2005, *K. Wilk 3493* and *4139* (KRAM). PIENINY WŁAŚCIWE MTS, Pieniny National Park, limestone outcrops by Czorsztyń Castle, 49°26'11"N, 20°18'48"E, alt. 560 m, on limestone, sunny place, S exposition, 5 June 2005, *K. Wilk 3467* (KRAM). MAŁE PIENINY MTS, near Jaworki village, Sołtysie Skałki outcrops, 49°24'24"N, 20°32'29"E, alt. 617 m, on upper parts of limestone outcrops, sunny place, 3 June 2005, *K. Wilk 3387* (KRAM).

ADDITIONAL SPECIMENS EXAMINED. RUSSIA. LIPETSK REGION. Eletsy district, Eletsy Landscape Reserve, Dernovskiy Kichy site, 52°34.552'N, 38°21.203'E, alt. 186 m, on limestone rock, 5 July 2012, *E. Muchnik s.n.* (VU); Zadonsky district, Galichya Gora State Reserve, Galichya Gora site, 52°39.338'N, 38°59.410'E, alt. 147 m, on limestone rock, 30 June 2012, *E. Muchnik s.n.* (VU).

***Caloplaca isidiigera* Vězda**

Fig. 3

Folia Geobot. Phytotax. Bohemoslov. **13**: 417. 1978.

The species is a member of the *C. cerina* group, which is characterized by having a dark grey to blackish, areolate and isidiate thallus, and lecanorine apothecia with orange discs. No other saxicolous species of the group known in Poland produces vegetative diaspores such as isidia, lobules or granules. Among the other European 'isidiate' species of the group, *C. squamuloisidiata* van den Boom & V. J. Rico and *C. thracopontica* Vondrák & Šoun are the most similar to *C. isidiigera*. *Caloplaca squamuloisidiata* differs from *C. isidiigera* in having a pale grey and subsquamulose thallus, branched coralloid isidia (globose to shortly elongated or flattened in *C. isidiigera*), and it occurs on siliceous rock (Vondrák *et al.* 2008b; Šoun *et al.* 2011; Vondrák & Wirth 2013). *Caloplaca thracopontica* differs from *C. isidiigera* in having a thallus producing pustules and lobules instead of typical isidia, and it occurs in maritime habitat on siliceous rock (Vondrák

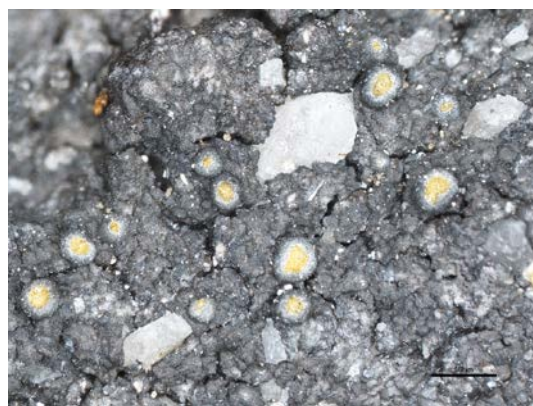


Fig. 3. *Caloplaca isidiigera* Vězda (*P. Czarnota s.n.*, GPN). Scale bar = 0.5 mm.

et al. 2008b). Another species of the group that could be confused with *C. isidiigera* is *C. chlorina* (Flot.) H. Olivier, but the latter produces soredia or blastidia instead of typical isidia. The lecanorine type of apothecia in *C. isidiigera* is a good diagnostic character distinguishing the species from other unrelated but similar taxa such as *C. conversa* (Kremp.) Jatta, *C. subpallida* H. Magn. and *C. xerica* Poelt & Vězda. They all form zeorine apothecia.

The species is confirmed from Europe (mainly the Alps and Carpathians) and North America (Šoun *et al.* 2011). It occurs in subalpine and alpine habitats on natural calcareous rock.

In Poland the species was found on calcareous sandstone in the Gorce Mts.

SPECIMEN EXAMINED. POLAND. WESTERN CARPATHIANS. GORCE MTS, Gorczański National Park, Polana Czoło glade, alt. 1260 m, on calcareous sandstone, 14 Aug. 1999, *P. Czarnota s.n.* (GPN).

Caloplaca scabrosa Söchting, Lorentsen & Arup
Fig. 4

Nova Hedwigia **87**: 89. 2008.

The species is a member of the *C. crenularia* group and is closely related to *C. ammiospila* (Ach.) H. Olivier and *C. furfuracea* H. Magn. (Vondrák *et al.* 2013). *Caloplaca scabrosa* is distinguished by its richly blastidiate, whitish thallus, and its biatorine red apothecia. The thallus contains

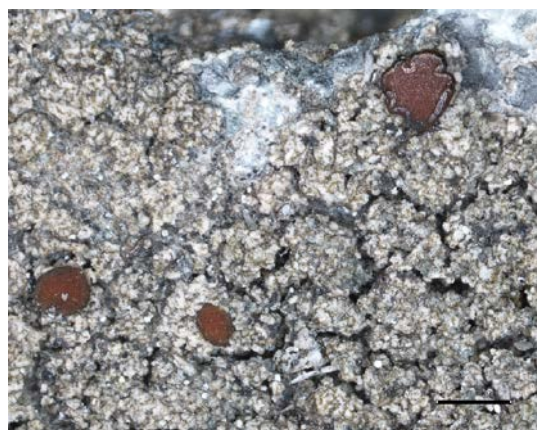


Fig. 4. *Caloplaca scabrosa* Söchting, Lorentsen & Arup (*A. Flakus 1889*, KRAM). Scale bar = 1 mm.

atranorin, a lichen secondary metabolite rare in Teloschistaceae (Söchting *et al.* 2008). *Caloplaca scabrosa* is very similar to *C. furfuracea* but the latter differs in having a less blastidiate thallus lacking atranorin, and it occurs on wood or rarely on tree bark (Arup & Åkelius 2009; Söchting *et al.* 2008), whereas *C. scabrosa* is epilithic. *C. ammiospila* is related to *C. scabrosa* but its thallus does not produce vegetative diaspores, it lacks atranorin, and it is muscicolous (Vondrák *et al.* 2013).

Caloplaca scabrosa was described from the Arctic (Svalbard). Most recently it was reported from the Czech Republic (Vondrák *et al.* 2013).

In Poland the species was found on limestone and mylonite rock in the Tatra Mts.

SPECIMENS EXAMINED. POLAND. WESTERN CARPATHIANS. HIGH TATRA MTS, Przełaczka pod Zadnim Mniczem pass, mylonite area, subnival belt, 49°11'19"N, 20°03'06"E, alt. 2135 m, on mylonite rock, 16 Aug. 2003, *A. Flakus 1889* (KRAM). WEST TATRA MTS, Rzędy, S slope of Ciemniak Mt., alt. ca 1800 m, 11 July 2004, *K. Wilk 2090* (KRAM).

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