

## NEW DISTRIBUTION DATA FOR STERILE CRUSTOSE LICHENS IN THE POLISH TATRA MTS AND ITS SURROUNDINGS

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**Abstract.** Distributional data resulting from a lichenological survey carried out in the Tatra National Park and adjacent areas, focus on the lichen diversity of various land-use types, such as pastures, grasslands, wet open habitats (as fens and bogs) and forests. The present contribution comprises records for 41 sterile lichens, of which two [*Candelariella efflorescens* R. C. Harris & W. R. Buck, *Pertusaria pupillaris* (Nyl.) Th. Fr.] are reported for the first time from the Polish Carpathians and six [*Fuscidea pusilla* Tønsberg, *Lecanora compallens* van Herk & Aptroot, *Lecidea nylanderii* (Anzi) Th. Fr., *Lecidella flavosorediata* (Vězda) Hertel & Leuckert, *L. subviridis* Tønsberg, *Scoliciosporum sarothamni* (Vain.) Vězda] from the Tatra Mts or the Sub-Tatra Trough. A new combination and status is proposed for *Lepraria jackii* var. *toensbergiana* (Bayerová & Kukwa) Kukwa. Remarks on the distribution and chemistry of all species and taxonomic comments for selected taxa are provided.

**Key words:** Carpathians, leprarioid lichens, lichenized fungi, sorediate and isidiate species

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### INTRODUCTION

Lichens which produce structures for vegetative reproduction commonly occur without fructifications and are assigned to so called ‘sterile lichens’. Sterile crustose species belonging to widely different genera may have very similar appearance and in such cases characters of chemistry are indispensable (Tønsberg 1992). Therefore, facilities for the application of secondary metabolites in lichen taxonomy, by the standardized thin-layer chromatographic techniques introduced by Culberson and Kristinsson (1970), are particularly important. The number of known taxa of sterile lichens is increasing worldwide due to the extended general knowledge of lichens, more particularly as a result of the pioneering and comprehensive work by Tønsberg (1992) dealing with sorediate and isidiate, corticolous crustose lichens of Norway. The latter account, for example, discovered a large number of inconspicuous, sterile species which had previously been neglected or overlooked. Nevertheless, the exploration of the systematic and biogeography of this group of lichens is far from complete.

Our knowledge of the lichen biota of the Polish Tatra Mts and the Sub-Tatra Trough is summarized in Bielczyk (2003), after which the lichens of the region received much attention by several lichenologists (Czarnota & Kukwa 2004; Flakus 2004, 2005, 2006a, b, 2007; Krzewicka 2004a, b, 2006; Olech 2004; Cykowska & Flakus 2005; Flakus & Bielczyk 2006; Krzewicka & Galas 2006; Osyczka *et al.* 2006; Śliwa 2006a, b; Wilk & Flakus 2006; Węgrzyn 2006, 2008, 2009; Czarnota *et al.* 2009; Krzewicka *et al.* 2009; Kukwa & Flakus 2009; Śliwa & Flakus 2011; Flakus & Śliwa 2012). The cited papers supplied two species new to science (Krzewicka *et al.* 2009; Śliwa & Flakus 2011) and many new regional records, but most of the latter refer to the highest parts of the range, especially the subnival belt and are concerned with saxicolous and terricolous lichens (e.g., Flakus 2004, 2005, 2006a, b, 2007) or lichenicolous fungi (Kukwa & Flakus 2009). Despite intensive investigations in this mountain range over the past decade some lichen groups

(including sterile species), particularly at lower elevations and in less attractive habitats, remain greatly underexplored. The only modern research that has revealed numerous new and noteworthy records of sterile lichens in the Polish Tatras is that by Kukwa (2004a), who treated *Lepraria* species in the East and West Tatra Mts.

In 2004, a lichenological survey was carried out in the Tatra Mts and the Sub-Tatra Trough aimed at estimating lichen diversity on various land-use types, such as pastures, grasslands, wet open habitats (as fens and bogs) and forests. The a large and diverse lichen collection derived from this survey provided a source of new or otherwise remarkable records, of which 30 selected lichens and allied fungi have already been commented upon by Śliwa (2006a). The present account reports 41 additional lichens (mostly sorediate, isidiate or leprarioid species), two of which are recorded for the first time from the Polish Carpathians and six from the Tatra Mts or the Sub-Tatra Trough.

## MATERIALS AND METHODS

The study, based on material collected in the summer of 2004 for the project LACOPE<sup>1</sup>, focused on the investigation of lichen diversity of various land-use types, for which biodiversity assessment tools were applied (Scheidegger *et al.* 2002; see also Śliwa 2006a, b). In total, 30 sampling plots of 1 ha were explored, representing previously pastured, now abandoned land, intensive and extensive pastures, mown grasslands, wet open habitats (as fens and bogs) and forests. The plots were located in the Tatra National Park or adjacent area at an elevation of 890–1200 m (Fig. 1). Voucher specimens are available at KRAM, with several duplicates at UGDA.

The chemistry of most specimens cited here was studied by thin-layer chromatography (TLC) using the methods of Culberson and Kristinsson (1970) and Orange *et al.* (2001). Details of detected secondary metabolites are provided since the chemistry of these lichens is still poorly studied in Poland. When a particular substance was present in only some specimens it is marked with (±). In some cases, spot-test-reactions with C, K,

I and Pd were also applied on different thallial parts to locate some secondary metabolites.

Distribution of species in Poland and the Carpathians is discussed, based on Fałtynowicz (2003) and Bielczyk (2003) respectively or revisionary works (Kukwa 2006a; Jabłońska 2009), supplemented with examples of more recent published contributions. New regional records are indicated by ‘!’ in the case of the Polish Tatra and/or the Sub-Tatra Trough, and by ‘!!’ in the case of the Polish Carpathians.

## RESULTS AND DISCUSSION

Eight of the treated 41 taxa of sorediate, isidiate or leprarioid lichens are new to the Polish Tatra Mts and/or the Sub-Tatra Trough (including the two new records to the Polish Carpathians): *Candelariella efflorescens*, *Fuscidea pusilla*, *Lecanora compallens*, *Lecidea nylanderi*, *Lecidella flavosorediate*, *L. subviridis*, *Pertusaria pupillaris* and *Scoliciosporum sarothamni*. Most of the newly reported species are corticolous and lignicolous, and some are muscicolous and saxicolous lichens. They vary in frequency and their known distribution in Poland and in the Carpathians. It is worth noting that several of the species listed below are the first regional or country records confirmed by thin-layer chromatography.

## LIST OF SPECIES

### *Biatora efflorescens* (Hedl.) Räsänen

Although this species is known from numerous localities in Poland (Fałtynowicz 2003; Kościelniak 2004; Kubiak 2005, 2009; Fałtynowicz & Kukwa 2006; Kossowska 2006; Szczepańska 2008; Czarnota 2010), it is treated as vulnerable (category VU) (Cieśliński *et al.* 2006). It was very rarely reported from the study area (Bielczyk 2003). When sterile, it can be misidentified with some other lichens giving the same colour with spot test reactions (especially with Pd), but it is the only one containing argopsin (Tønsberg 1992).

**CHEMISTRY.** Argopsin, norargopsin (±), unknown substance visible before charring as yellowish spot in Rf class C 3.

<sup>1</sup> *Landscape Development, Biodiversity and Co-operative Livestock Systems in Europe*

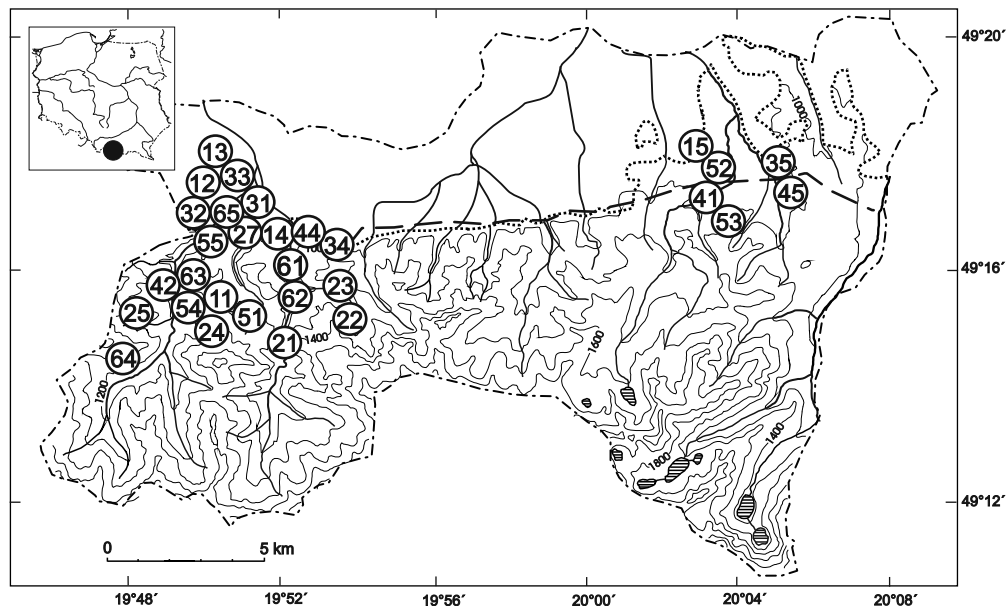


Fig. 1. Location of the study plots in the Polish Tatra Mts. and the Sub-Tatra Trough.

**SPECIMENS EXAMINED. WESTERN TATRA MTS.** Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2641a, on bark of *Fraxinus excelsior*, 7 July 2004, *L. Śliwa* 2654. **SUB-TATRA TROUGH.** Tatra National Park: near Małe Ciche village, Brzanówka glade, 49°17'23"N, 20°05'21"E (plot 45), alt. 930 m, mown grassland, on bark of *Fraxinus excelsior*, 24 July 2004, *L. Śliwa* 3375.

***Buellia griseovirens* (Turner & Borrer ex Sm.) Almb.**

Although considered a common lichen in Poland (Fałtynowicz 2003), its determinations have only recently been confirmed by chemical analysis (e.g., Kubiak 2005, 2009; Czarnota 2010; Śliwa 2010). So far it was rarely found in the study area (Bielczyk 2003; Krzewicka 2004a; Węgrzyn 2009), but perhaps it is common there but overlooked. Without application of TLC and when the outermost soredia lack a bluish tinge, the taxon is likely to be confused with several lichens (e.g., some *Fuscidea* species), but it differs in the presence of atranorin and norstictic acid. Sometimes the thalli

may lack norstictic acid (Tønsberg 1992), and then special attention must be paid in its separation from other lichens. So far all Polish samples contained norstictic acid. In four specimens, unidentified pigments 'griseovirens unknowns' sensu Tønsberg (1992) were detected; this is the first record of these substances in Polish material.

**CHEMISTRY.** Atranorin, norstictic acid, connorstictic acid (±, trace), 'griseovirens unknowns' (±); specimens containing the last substances marked below with an asterisk.

**SPECIMENS EXAMINED. WESTERN TATRA MTS.** Tatra National Park: Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2232\*. **SUB-TATRA TROUGH.** Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), on bark of *Alnus incana*, 17 July 2004, *L. Śliwa* 3207\*; Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on stump, 16 June 2004, *L. Śliwa* 2301\*; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004,

*L. Śliwa 2889b*, on wood, 13 July 2004, *L. Śliwa 2903\**; near Małe Ciche village, Wawrzeczkowa Cyrhla glade, 49°17'13"N, 20°03'32"E (plot 53), alt. 950 m, extensive pasture, on log, 16 June 2004, *L. Śliwa 2254*.

**!!*Candelariella efflorescens* R. C. Harris & W. R. Buck**

The distribution of *C. efflorescens* has been poorly documented to date, being only recently reported as new to Poland (Kubiak & Westberg 2011) as a result of revision of *C. reflexa* (Nyl.) Lettau in the north-eastern and central part of the country. The authors concluded that the latter species was mistakenly reported from the area and the revised material in fact represents *C. efflorescens*. Re-examination of the material of *C. reflexa* from the Tatra Mts (see Śliwa 2006a) yielded a new regional record of *C. efflorescens* that extends its range to the southern Poland. The two species differ in the number of ascospores per ascus and the thallus morphology; in *C. efflorescens* asci are 24–30-spored and the thallus is granular to areolate with soralia developing at the edges of areoles, whereas in *C. reflexa* the asci are 8-spored and the thallus is distinctly effigurate to almost rosette-like when well developed and sorediate from the centre of the areoles (Westberg 2007; Kubiak & Westberg 2011).

CHEMISTRY. Not tested.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Fraxinus excelsior*, 7 July 2004, *L. Śliwa 2656*. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa 2892*; near Małe Ciche village, Wawrzeczkowa Cyrhla glade, 49°17'13"N, 20°03'32"E (plot 53), alt. 950 m, extensive pasture, on log, 16 June 2004, *L. Śliwa 2261*.

**!*Fuscidea pusilla* Tønsberg**

This species was reported from Poland by Śliwa and Tønsberg (1995), since when it has been found in several other parts of the country (e.g., Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Kubiak

2005; Fałtynowicz & Kukwa 2006; Szczepańska 2008; Czarnota 2010; Śliwa 2010). In 2003 it was also recorded in the Orawsko-Podhalańska Depression (Bielczyk & Betleja 2003). According to our data, it appears to be rather common in the Tatra Mts and its surroundings.

*Fuscidea pusilla* can be mistaken for *F. lightfootii* (Sm.) Coppins & P. James, another corticolous species containing divaricatic acid, which, however, often has black-brown soredia, a black prothallus, a larger thallus (up to 5 mm in diam.) and produces apothecia. In contrast, *F. pusilla* has green to pale yellowish soralia, a brown prothallus, smaller thalli (usually up to 1 cm in diam.) and always lacks apothecia (Tønsberg 1992). It can also be confused with *Ropalospora viridis*, but the latter produces perlatolic acid (see under that species).

CHEMISTRY. Divaricatic acid.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Huciska glade, 49°15'32"N, 19°49'07"E (plot 42), alt. 1000 m, mown grassland, on bark of *Picea abies*, 19 June 2004, *L. Śliwa 2551*; Dolina Chochołowska valley, Polana Jamy glade, 49°15'21"N, 19°49'15"E (plot 54), alt. 1085 m, extensive pasture, 16 July 2004, *L. Śliwa 3182a*. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on bark of *Alnus incana*, 17 July 2004, *L. Śliwa 3276*; Dolina Lejowa valley, Polana Biały Potok glade, 49°16'42"N, 19°50'55"E (plot 43), alt. 930 m, mown grassland, on bark of *Picea abies*, 12 July 2004, *L. Śliwa 2836*; Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, 11 July 2004, *L. Śliwa 2819*; Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa 3210*; N of Hawryłówka glade 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 17 July 2004, *L. Śliwa 3228*; Tatra National Park: near Małe Ciche village, N of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, 24 July 2004, *L. Śliwa 3294*; between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, bark of *Picea abies*, 12 July 2004, *L. Śliwa 2844, 2864*.

***Hypocenomyce caradocensis*** (Leight. ex Nyl.)  
P. James & Gotth. Schneid.

This species is frequent in Poland (Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Leśniński 2010; Śliwa 2010), but rarely reported from the Tatra Mts (Bielczyk 2003); however, in the present study it appeared to be rather common in the area and was probably overlooked previously due to its resemblance to *H. scalaris* (Ach.) M. Choisy, with which it is often associated. However, it can be easily distinguished from the latter by its esorediate, bullate areoles and C– reaction (Timdal 1984).

CHEMISTRY. Friesiic acid.

SPECIMENS EXAMINED. WESTERNERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 18 June 2004, *L. Śliwa* 2449; Dolina Chochołowska valley, Polana Przystop Chochołowski glade, 49°15'23"N, 19°48'10"E (plot 25), alt. 1200 m, previously pastured, now abandoned land, on wood of shepherd hut, 18 June 2004, *L. Śliwa* 2442. SUB-TATRA TROUGH. Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, 11 July 2004, *L. Śliwa* 2787; Magura Witowska range, N of Hawryłówka glade, 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3223; Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3216; Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on stump, 16 June 2004, *L. Śliwa* 2298; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa* 2905.

**! *Lecanora compallens*** van Herk & Aptroot

Although only reported for the first time from Poland by Kowalewska and Kukwa (2003), this is a rather common species there, being greatly

under-recorded. It was reported from the Polish Carpathians by Czarnota (2010). This species is morphologically and chemically very similar to *L. expallens* Ach., from which it cannot be distinguished without the application of TLC; it differs from *L. expallens* in the absence of xanthones (Tønsberg 1992; van Herk & Aptroot 1999).

CHEMISTRY. Usnic acid, zeorin, traces of unidentified terpenoids.

SPECIMEN EXAMINED. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3283.

***Lecanora expallens*** Ach.

A commonly reported species in Poland (Fałtynowicz 2003) and frequently recorded in the Tatra Mts (Bielczyk 2003). However, most records, especially those from the previous century require revision due to some recent taxonomic novelties in this species group. For the separation from *L. compallens*, see under that species.

CHEMISTRY. Usnic acid, zeorin, thiophanic acid, cf. arthothelin, 'expallens unknown' sensu Tønsberg (1992).

SPECIMENS EXAMINED. WESTERNERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Picea abies*, 7 July 2004, *L. Śliwa* 2741a. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa* 2895b.

**! *Lecideia nylanderii*** (Anzi) Th. Fr.

This species has been very rarely recorded in Poland prior to 2000 (see Fałtynowicz 2003) and therefore treated as endangered (category E) (Cieśliński *et al.* 1992), but since then it has been more frequently reported (e.g., Bielczyk 2003; Fałtynowicz 2003; Łubek & Cieśliński 2004; Kukwa 2005, 2009; Łubek 2007; Kukwa *et al.* 2008; Szymczyk & Kukwa 2008; Czarnota 2010) and therefore not considered as threatened. In the vicinity of the Tatra Mts (in the Orawsko-

Podhalańska Depression) it was recorded by Bielczyk and Betleja (2003). It appears to be common in the study area.

It can be misidentified with members of the genus *Lepraria*, especially *L. elobata* (producing similar grey soredia) and *L. incana* (containing divaricatic acid). However, *Lecidea nylanderii* can be easily distinguished by its different chemistry (it lacks atranorin, stictic acid complex and zeorin; see notes on the chemistry under both *Lepraria* species) and by its blackish-blue, often conspicuous prothallus (Tønsberg 1992).

CHEMISTRY. Divaricatic acid.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 18 June 2004, *L. Śliwa* 2446; Dolina Kościeliska valley, Polana Pisana glade, 49°14'33"N, 19°51'53"E (plot 21), alt. 1040 m, previously pastured, now abandoned land, on bark of *Picea abies*, 14 July 2004, *L. Śliwa* 2930; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 15 July 2004, *L. Śliwa* 3041; Dolina Kościeliska valley, Wyznia Miętusia Polana glade, 49°15'09"N, 19°53'46"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 17 June 2004, *L. Śliwa* 2347. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3285; Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 11 July 2004, *L. Śliwa* 2779, 2820, 2811, 2826; Magura Witowska range, N of Hawryłówka glade 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3227; Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3215a; Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 12 July 2004, *L. Śliwa* 2843; near Małe Ciche village, N, of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest

with *Picea abies* and *Abies alba*, 24 July 2004, *L. Śliwa* 3295b, 3316a.

***Lecidella flavosorediata*** (Vězda) Hertel & Leuckert

This species is perhaps common in Poland, as our unpublished results suggest (also e.g. Kościelniak 2004; Kubiak 2005; Szczepańska 2008), but in the Carpathians it has previously been very rarely reported (Bielczyk 2003; Czarnota 2010). It is a sorediate lichen morphologically, similar to *Lecanora expallens*, of which it was very often mistaken in Poland (e.g., Kukwa 2005). Both species produce xanthonones, but *Lecidella flavosorediata* lacks usnic acid and zeorin, which are present in *Lecanora expallens*. The species is also similar to *Lecidella subviridis*, but the latter contains atranorin and thiophanic acid (Tønsberg 1992).

CHEMISTRY. Arthothelin, granulysin, unidentified xanthone in Rf class C 4.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Tilia cordata*, 7 July 2004, *L. Śliwa* 2712; Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2228. SUB-TATRA TROUGH. Magura Witowska range, Molkówka glade, 49°16'45"N, 19°49'39"E (near plot 55), alt. 970 m, extensive pasture, on bark of *Populus* sp., 8 July 2004, *L. Śliwa* 2760.

***Lecidella subviridis*** Tønsberg

This inconspicuous lichen has only rarely been reported from Poland (Bielczyk 2003; Czarnota & Kukwa 2004; Kukwa 2006a; Kubiak & Kukwa 2008; Czarnota 2010). It is perhaps much more common, but indistinguishable without using TLC from similar taxa (e.g., *Lecanora expallens* containing usnic acid, zeorin and xanthonones, or *Lecidella flavosorediata* containing only xanthonones; see notes under those species).

CHEMISTRY. Atranorin, thiophanic acid, cf. arthothelin ( $\pm$ ), 'expallens unknown' sensu Tønsberg (1992), traces of unidentified xanthonones ( $\pm$ ).

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Polana Pisana glade, 49°14'33"N, 19°51'53"E (plot 21), alt. 1040 m, previously pastured, now abandoned land, on bark of *Picea abies*, 14 July 2004, *L. Śliwa* 2928; Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'46"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 17 June 2004, *L. Śliwa* 2343; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 15 July 2004, *L. Śliwa* 3013, 3019, 3022; Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2641b; Dolina Lejowa valley, Niznia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on bark of *Picea abies*, 15 June 2004, *L. Śliwa* 2154. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on bark of *Alnus incana*, 17 July 2004, *L. Śliwa* 3252, 3270, 3277, 3284, 3288; Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), 17 July 2004, *L. Śliwa* 3208; Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa* 2893.

### *Lepraria diffusa* (J. R. Laundon) Kukwa

This species is rare in Poland (Kukwa 2006a; Czarnota 2010), and previously reported from only one locality in the Tatra Mts (Flakus 2007). It is morphologically similar to *L. vouauxii*, but differs in its dibenzofuran composition (Tønsberg 1992; Kukwa 2006a).

CHEMISTRY. 4-oxypannaric acid 2-methyl ester, pannaric acid, traces of unidentified dibenzofurans.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'46"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bryophytes growing on rock, 17 June 2004, *L. Śliwa* 2384; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on rock, 15 July 2004, *L. Śliwa* 3024.

### *Lepraria eburnea* J. R. Laundon

This lichen is unevenly distributed in Poland, being more common in the mountains (Kukwa 2006a; also Łubek & Cieśliński 2004; Kossowska 2006, 2008; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010). In the Tatra Mts it was reported only from an area containing calcareous rocks (Kukwa 2004a). This species is characterized by the presence of alectorialic acid, its powdery thallus, and its occurrence in habitats protected from direct rain. Morphologically it is very similar to *L. lobificans*, but the latter contains atranorin, stictic acid complex and zeorin. In Poland only *L. neglecta* (Nyl.) Erichsen also produces alectorialic acid, but it has a granular thallus consisting of coarse soredium-like granules and prefers habitats exposed to direct rain (Tønsberg 1992; Kukwa 2006a).

CHEMISTRY. Alectorialic, barbatolic ( $\pm$ ) and protocetraric ( $\pm$ ) acids.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on rock, 18 June 2004, *L. Śliwa* 2481, on mosses growing on rock, *L. Śliwa* 2483, 2491; Dolina Chochołowska valley, Polana Dudowa glade, 49°14'58"N, 19°49'37"E (plot 24), alt. 1185 m, previously pastured, now abandoned land, 16 July 2004, *L. Śliwa* 3175; Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bryophytes growing on rock, 17 June 2004, *L. Śliwa* 2390.

### *Lepraria elobata* Tønsberg

This species is common in Poland (Kukwa 2006a; also Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010), but in the Tatra Mts it has previously been recorded from only a few localities (Krzewicka 2004a; Kukwa 2004a; Węgrzyn 2009); the data presented here confirm that it is also common in the latter region. *L. elobata* is easily distinguished from most other members of the genus by its chemistry, unstratified thallus and soredium-like granules lacking projecting hyphae.

*L. lobificans* is the only other species to contain the same substances, but differs in its stratified thallus with a well developed hypothallus, and the soredia with long projecting hyphae (Tønsberg 1992; Kukwa 2006a).

CHEMISTRY. Atranorin, zeorin, stictic acid complex.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on stump, 18 June 2004, *L. Śliwa* 2472, on mosses growing on stone, *L. Śliwa* 2494; Dolina Chochołowska valley, Polana Chochołowska glade, 49°14'16"N, 19°47'47"E (plot 64), alt. 1105 m, intensive pasture, 16 July 2004, *L. Śliwa* 3066; Dolina Chochołowska valley, Polana Huciska glade, 49°15'28"N, 19°49'19"E (plot 63), alt. 1025 m, intensive pasture, 19 June 2004, *L. Śliwa* 2606, 2621b; Dolina Chochołowska valley, Polana Przysłop Chochołowski glade, 49°15'23"N, 19°48'10"E (plot 25), alt. 1200 m, previously pastured, now abandoned land, bark of *Picea abies*, 18 June 2004, *L. Śliwa* 2428, on soil, *L. Śliwa* 2429; Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2638a, on bark of *Picea abies*, *L. Śliwa* 2742. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), 17 July 2004, *L. Śliwa* 3248; Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on stump, 12 July 2004, *L. Śliwa* 2853; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, 13 July 2004, *L. Śliwa* 2882b, 2907b; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, 24 July 2004, *L. Śliwa* 3304, 3320; Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on rock, 16 June 2004, *L. Śliwa* 2304, on bark of *Picea abies*, *L. Śliwa* 2307.

### *Lepraria incana* (L.) Ach.

This species is the commonest member of the genus in Poland (Kukwa 2004b, 2006b; Łubek & Cieśliński 2004; Kossowska 2006; Łubek

2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010), but in the mountains it is very rare (Kukwa 2004a, b). It has been reported several times from the Tatra Mts (see Bielczyk 2003), but some of those records require confirmation by TLC; more recently it has been recorded from a few localities in that area (Krzewicka 2004a; Kukwa 2004a; Węgrzyn 2009).

*Lepraria incana* is morphologically rather variable due to the wide range of habitats it occupies (e.g., in shaded situations its thallus is thick and greenish-grey to whitish-green, but in highly insolated places it can get more compacted, thinner and bluish tinged). However, chemically it always contains divaricatic acid and zeorin in large amounts. *L. crassissima* (Hue) Lettau also produces these substances, but additionally with nordivaricatic acid in high concentrations (rarely present in *L. incana* and then only in trace or minor amounts) and in Poland grows only on rocks (*L. incana* usually on bark or wood) (Tønsberg 1992; Kukwa 2006a)

CHEMISTRY. Divaricatic acid, zeorin.

SPECIMEN EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Picea abies*, 7 July 2004, *L. Śliwa* 2741b.

### *Lepraria jackii* Tønsberg var. *jackii*

This species is common and widely distributed in Poland (Kukwa 2006a; also Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010), but in the Tatra Mts it is known only from a few localities (Krzewicka 2004a; Kukwa 2004a; Flakus 2007; Węgrzyn 2009); however, the data presented here suggest that the lichen is common in the study area. It can be separated from other *Lepraria* species known from Poland by the powdery thallus and the presence of fatty acids (Tønsberg 1992; Kukwa 2006a). For the differences from *L. jackii* var. *toensbergiana* see below.

CHEMISTRY. Atranorin, jackinic and roccellic acids.



SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 18 June 2004, *L. Śliwa* 2452, on stump, *L. Śliwa* 2476; Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2639. SUB-TATRA TROUGH. Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, 11 July 2004, *L. Śliwa* 2780, *L. Śliwa* 2785, 2796, 2810; Magura Witowska range, N of Hawryłówka glade, 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3231; Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on bark of *Abies alba*, 12 July 2004, *L. Śliwa* 2846; near Małe Ciche village, N, of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, 24 July 2004, *L. Śliwa* 3311, 3295a.

***Lepraria jackii* Tønsberg var. *toensbergiana*** (Bayerová & Kukwa) Kukwa, *comb. et stat. nov.*

BASIONYM: *Lepraria toensbergiana* Bayerová & Kukwa, in Bayerová *et al.*, Bryologist **108**(1): 132. 2005.

MycoBank no. MB 800235

This taxon was described at the species level, but phylogenetically it was nested within the well-supported clade of *L. jackii*, from which it differed in the chemistry: jackinic/rangiformic acid in *L. jackii* and toensbergianic acid in *L. toensbergiana* and four nucleotide changes in ITS sequence (Bayerová *et al.* 2005). As both taxa are morphologically identical, Baruffo *et al.* (2006) reduced *L. toensbergiana* to a synonym of *L. jackii*. Their opinion was supported by specimens intermediate in chemistry and containing jackinic/rangiformic and toensbergianic acids together, and therefore they concluded the differences in chemistry were irrelevant. In our opinion such material could be a result of co-occurrence of both taxa, what we were able to demonstrate by analysing small portions of thalli from different parts of such 'inter-

mediate' sample. A similar case was also found for material intermediate in chemistry between morphologically similar *L. elobata* and *L. humida* Sláviková & Orange (Fehrer *et al.* 2008). The distinction of *L. jackii* and *L. toensbergiana* was also doubted by Tretiach *et al.* (2009).

Fehrer *et al.* (2008) presented new molecular data and found that *L. toensbergiana* was indeed a part of the *L. jackii* clade, but formed a well-supported monophyletic clade consisting of four samples from a broad geographic range. As both taxa are chemically different, we believe they deserve to be kept as distinct entities, but we propose to reduce *L. toensbergiana* to the variety level within *L. jackii*. Similar cases, when taxa differ in subtle chemical and/or morphological characters, are known in *Cladonia arbuscula* (Wallr.) Flotow *s.l.* (Piercey-Normore *et al.* 2010) and *Leprogium pulvinatum* (Hoffm.) Otálora *s.l.* (Otálora *et al.* 2008).

*Lepraria jackii* var. *toensbergiana* is rare in Poland, with only two localities previously known in the Tatra Mts (Bayerová *et al.* 2005) and a few in the Karkonosze Mts (Kossowska 2006).

CHEMISTRY. Atranorin and toensbergianic acid.

SPECIMEN EXAMINED. SUB-TATRA TROUGH. Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, on bark of *Abies alba*, 11 July 2004, *L. Śliwa* 2821.

***Lepraria lobificans* Nyl.**

This species is widespread and common in Poland (Kukwa 2006a; also Kościelniak 2004; Łubek & Cieśliński 2004; Kossowska 2006, 2008; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010), however, rarely reported from the Tatra Mts (Bielczyk 2003; Krzewicka 2004a; Kukwa 2004a; Flakus 2007; Węgrzyn 2009). Perhaps it is also common in the study area. It is easily separated from other taxa by its chemistry, cottony stratified thallus, and soredium-like granules with long projecting hyphae (Tønsberg 1992; Kukwa 2006a).

CHEMISTRY. Atranorin, zeorin, stictic acid complex.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Huciska glade, 49°15'28"N, 19°49'19"E (plot 63), alt. 1025 m, intensive pasture, 19 June 2004, *L. Śliwa* 2607, 2621a; Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on mosses, 18 June 2004, *L. Śliwa* 2489; Dolina Chochołowska valley, Polana Dudowa glade, 49°14'58"N, 19°49'37"E (plot 24), alt. 1185 m, previously pastured, now abandoned land, on mosses, 16 July 2004, *L. Śliwa* 3154; Dolina Kościeliska valley, Wyznia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on mosses growing on rock, 17 June 2004, *L. Śliwa* 2328; Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2207.

### *Lepraria membranacea* (Dicks.) Vain.

Previously, this species has been commonly reported in Poland (Fałtynowicz 2003), but most records were misidentifications, the collections being in fact represented by *L. lobificans* and *L. vouauxii*, from which *L. membranacea* can be distinguished by the presence of distinct lobes and the production of pannaric acid (Kukwa 2006a). Currently, it can be considered a rare lichen in the mountains of Poland (Kukwa 2006a), with only a few records confirmed by chemical study from the Tatra Mts (Kukwa 2004a; Krzewicka 2004a; also Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010).

CHEMISTRY. Pannaric and roccellic acids.

SPECIMEN EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Chochołowska glade, 49°14'16"N, 19°47'47"E (plot 64), alt. 1105 m, intensive pasture, on rock, 16 July 2004, *L. Śliwa* 3070.

### *Lepraria rigidula* (B. de Lesd.) Tønsberg

The species is frequent in Poland (Kukwa 2006a; also Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010), but has only been recorded from a few

localities in the high parts of the range the Tatra Mts (Kukwa 2004a; Flakus 2007). It is the only member of the genus containing nephrosteranic acid. Thalli are whitish, and soredium-like granules often possess well developed projecting hyphae (Tønsberg 1992; Kukwa 2006a).

CHEMISTRY. Atranorin and nephrosteranic acid.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba* and *Fraxinus excelsior*, 7 July 2004, *L. Śliwa* 2638b, 2649; Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2238. SUB-TATRA TROUGH. Magura Witowska range, Hawryłówka glade, 49°17'24"N, 19°50'38"E (plot 33), alt. 910 m, wet open habitat (bog), on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3215b; Tatra National Park: near Małe Ciche village, Brzanówka glade, 49°17'23"N, 20°05'21"E (plot 45), alt. 930 m, mown grassland, on bark of tree, 24 July 2004, *L. Śliwa* 3369; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa* 2895a.

### *Lepraria vouauxii* (Hue) R.C. Harris

This species is quite common in Poland (Kukwa 2006a; also Łubek & Cieśliński 2004; Łubek 2007; Kossowska 2008; Szczepańska 2008; Czarnota 2010; Śliwa 2010), but less frequently recorded in the Tatra Mts (Bielczyk 2003; Kukwa 2004a; Flakus 2006b, 2007); for the known distribution of the species there see Flakus (2006b).

CHEMISTRY. Pannaric acid-6-methylester with satellites.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on stone, 18 June 2004, *L. Śliwa* 2478; Dolina Kościeliska valley, Wyznia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bryophytes growing on rock, 17 June 2004, *L. Śliwa* 2413.

***Loxospora elatina*** (Ach.) A. Massal.

Although this species is frequently reported from Poland (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kukwa 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010), it is considered as endangered (category EN) (Cieśliński *et al.* 2006). In the Tatra Mts it was known from several localities (Bielczyk 2003). *L. elatina* is very likely to be confused with *Ochrolechia* species, especially *O. microstictoides* Räsänen, which can also grow on coniferous trees, but it contains thamnolic acid in the thallus, whereas *Ochrolechia* spp. produce variolaric or gyrophoric acids (Tønsberg 1992).

CHEMISTRY. Thamnolic and elatinic ( $\pm$ ) acids.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, between Polana Huciska and Polana Jamy glades, 49°15'24"N, 19°49'20"E (plot 11), alt. 1060 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 18 June 2004, *L. Śliwa* 2447; Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2640; Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bark of tree, 17 June 2004, *L. Śliwa* 2393. SUB-TATRA TROUGH. Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, on bark of trees, 11 July 2004, *L. Śliwa* 2794, 2797, 2802, 2817, 2786; Magura Witowska range, N of Hawryłówka glade, 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 17 July 2004, *L. Śliwa* 3226. Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on bark of *Abies alba*, 12 July 2004, *L. Śliwa* 2850; near Małe Ciche village, Brzanówka glade, 49°17'23"N, 20°05'21"E (plot 45), alt. 930 m, mown grassland, on bark of *Abies alba*, 24 July 2004, *L. Śliwa* 3355; near Małe Ciche village, N of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, on bark of trees, 24 July 2004, *L. Śliwa* 3296, 3316b.

***Mycoblastus alpinus*** (Fr.) Th. Fr. ex Hellb.

In Poland this species only occurs in the Carpathians (Bielczyk 2003; Fałtynowicz 2003), where it is rare, and is considered as endangered (category EN) (Cieśliński *et al.* 2006). It is very rare species in the study area (Bielczyk 2003). It is highly characteristic due to its chemistry and grey to green thallus with yellow or yellowish-green soralia (Tønsberg 1992).

CHEMISTRY. Atranorin, usnic and planaic acids, unidentified terpenoid in Rf class C 6 visible as ice-blue spot after charring in UV light.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Fraxinus excelsior*, 7 July 2004, *L. Śliwa* 2658.

***Pertusaria albescens*** (Huds.) M. Choisy & Werner

Although this is a common species in Poland (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Leśniński 2010; Śliwa 2010) and in the study area (Bielczyk 2003), it has rarely been subjected to chemical studies. It is very similar to *P. amara*, but differs in its mild taste (not bitter as in *Pertusaria amara*) and lack of picrolichenic acid (Tønsberg 1992).

CHEMISTRY. Allo-pertusaric and dihydroper-tusaric acids.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Fraxinus excelsior* and *Tilia cordata*, 7 July 2004, *L. Śliwa* 2646, 2706.

***Pertusaria amara*** (Ach.) Nyl.

This is the commonest member of the genus in Poland and in the Carpathians (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005, 2009; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Leśniński 2010), and appears to be frequent

in the study area (Bielczyk 2003; Flakus 2007; Węgrzyn 2009). The species is chemically variable, but always contains picrolichenic acid, which can be accompanied with unknown substance related to it; it can also produce protocetraric acid (Tønsberg 1992). There are no chemical data of the species from Poland, but according to our unpublished results all the above-mentioned substances were detected in Polish material.

CHEMISTRY. Picrolichenic acid.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Tilia cordata*, 7 July 2004, *L. Śliwa* 2692.

### *Pertusaria coccodes* (Ach.) Nyl.

This species has been frequently reported in the country (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005, 2009; Kossowska 2006; Łubek 2007; Szczepańska 2008; Leśniański 2010; Czarnota 2010), but it is treated as near threatened (category NT) (Cieśliński *et al.* 2006). It has been reported from the Tatra Mts by several authors, but all records refer to previous century (Bielczyk 2003). *P. coccodes* is variable in its isidia development (verruciform, cylindrical to coralloid branched), but the secondary chemistry makes the species easily identifiable (Tønsberg 1992).

CHEMISTRY. Norstictic and connorstictic acids.

SPECIMENS EXAMINED. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Brzanówka glade, 49°17'23"N, 20°05'21"E (plot 45), alt. 930 m, mown grassland, on bark of tree, 24 July 2004, *L. Śliwa* 3386.

### *Pertusaria coronata* (Ach.) Th. Fr.

This species has been known from numerous records from Poland, but many of them are older than 20 years (Bielczyk 2003; Fałtynowicz 2003; except Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007 and Leśniański 2010) and it is considered as vulnerable (category VU) (Cieśliński *et al.* 2006). It has rarely been subjected to chemical

analyses in Poland (Szymczyk & Kukwa 2008); this is important for its correct identification since it can be mistaken for *P. coccodes* and *P. flavida* (DC.) J. R. Laundon, from which it can be separated by the secondary chemistry: *P. coccodes* contains norstictic acid as a major secondary metabolite, whereas *P. flavida* contains thiophanic acid as a diagnostic substance (Tønsberg 1992).

CHEMISTRY. Coronaton and stictic acid complex.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Tilia cordata*, 7 July 2004, *L. Śliwa* 2689a, 2710.

### !!*Pertusaria pupillaris* (Nyl.) Th. Fr.

This species is rarely found in Poland (Fałtynowicz 2003; Łubek & Cieśliński 2004; Kukwa 2005; Łubek 2007; Szczepańska 2008; Kubiak *et al.* 2010), and is categorized as 'near threatened' (NT) by Cieśliński *et al.* (2006). *Pertusaria pupillaris* is an inconspicuous lichen, and morphologically and chemically similar to *P. borealis* Erichsen, from which it can often be distinguished by its thinner thallus and absence of succinprotocetraric acid (Tønsberg 1992). However, some intermediate forms exist between the two species and the separation of them needs further study.

CHEMISTRY. Fumarprotocetraric acid.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Lejowa valley, Niżnia Polana Kominiańska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2233.

### *Phlyctis argena* (Spreng.) Flot.

This is common lichen in Poland and in the Carpathians (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Leśniański 2010; Śliwa 2010). It is hardly likely to be confused with other sorediate, corticolous lichens due to its diffuse soralia and chemistry, but in the field

it can be mistaken for some forms of *Ochrolechia androgyna* (Hoffm.) Arnold or *O. microstictoides* Räsänen (Tønsberg 1992).

CHEMISTRY. Norstictic and connorstictic acids.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Fraxinus excelsior* and *Tilia cordata*, 7 July 2004, *L. Śliwa* 2657, 2689b, 2709; Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2234.

### *Placynthiella dasaea* (Sitr.) Tønsberg

This is the commonest member of the genus in the country (Bielczyk 2003; Fałtynowicz 2003; Łubek & Cieśliński 2004; Kubiak 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010); however, it has very often been misidentified as *P. icmalea* or *P. uliginosa* in the past. It was previously reported from the study area by Krzewicka (2004a) and Węgrzyn (2009). *P. dasaea* can be distinguished from other members of the genus by its sorediate thallus reacting C+ red due to the presence of gyrophoric acid (Tønsberg 1992; Kukwa 2000). Sometimes its soredia are very compacted and resemble isidia; in such cases it is advisable to make a squash preparation with aqueous solution of KOH, and then the soredia separate one from another.

CHEMISTRY. In few tested specimens gyrophoric acid was present.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Przysłop Chochołowski glade, 49°15'23"N, 19°48'10"E (plot 25), alt. 1200 m, previously pastured, now abandoned land, on wood of shepherd hut, 18 June 2004, *L. Śliwa* 2438; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on wood of shepherd hut, 15 July 2004, *L. Śliwa* 3042; Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on wood of shepherd hut and on bark of *Picea abies*, 15 June 2004, *L. Śliwa* 2133, 2156. SUB-TATRA TROUGH.

Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, on log, 11 July 2004, *L. Śliwa* 2804; Magura Witowska range, N of Hawryłówka glade, 49°17'30"N, 19°50'37"E (plot 13), alt. 890 m, forest with *Picea abies* and *Abies alba*, on stump, 17 July 2004, *L. Śliwa* 3239. Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies* and on wood, 13 July 2004, *L. Śliwa* 2889a, 2897; between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, 12 July 2004, *L. Śliwa* 2872; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on stump, 16 June 2004, *L. Śliwa* 2299; Nędzówka village, Polana Gronik glade, 49°16'35"N, 19°53'39"E (plot 34), alt. 925 m, wet open habitat (bog), on stump, 14 July 2004, *L. Śliwa* 2981.

### *Placynthiella icmalea* (Ach.) Coppins & P. James

This isidiate species has been frequently reported from Poland and from the Carpathians (Bielczyk 2003; Fałtynowicz 2003; Krzewicka 2004a; Łubek & Cieśliński 2004; Kubiak 2005, 2009; Fałtynowicz & Kukwa 2006; Kossowska 2006; Flakus 2007; Szymczyk & Zalewska 2008; Czarnota 2010; Śliwa 2010). However, it is worth nothing that many older records may refer to *Placynthiella dasaea* from which it was not distinguished previously. Both *P. dasaea* and *P. icmalea* produce gyrophoric acid, but the former produces soredia, whereas the latter is isidiate (Tønsberg 1992; see also notes under the latter species).

CHEMISTRY. Not tested.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark stump, 7 July 2004, *L. Śliwa* 2718. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on stump, 17 July 2004, *L. Śliwa* 3247; Magura Witowska range, between Cicha Polana and Molkówka glades, 49°17'05"N, 19°49'33"E (plot 12), alt. 950 m, forest with *Picea abies* and *Abies alba*, on log, 11 July 2004, *L. Śliwa* 2782, 2805; Tatra National Park: near Małe Ciche village,

Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on stump, 16 June 2004, *L. Śliwa* 2300; near Małe Ciche village, Wawrzeczkowa Cyrhla glade, 49°17'13"N, 20°03'32"E (plot 53), alt. 950 m, extensive pasture, on wood, 16 June 2004, *L. Śliwa* 2253, 2272, 2281; near Małe Ciche village, N, of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, on mosses, 24 July 2004, *L. Śliwa* 3301.

***Placynthiella uliginosa*** (Schrad.) Coppins & P. James

This species has frequently been reported in Poland (see Bielczyk 2003; Fałtynowicz 2003), but according to our knowledge, numerous of these records refer to *P. dasaea* or *P. icmalea*, from which it was earlier not separated. More recently it has been recorded from various regions of the country (Kościelniak 2004; Łubek & Cieśliński 2004; Kubiak 2005; Kossowska 2006; Łubek 2007; Szczepańska 2008; Węgrzyn 2009; Czarnota 2010; Leśniński 2010; Śliwa 2010). It is characterized by its C–thallus and K– apothecial tissues (Kukwa 2000).

CHEMISTRY. Not tested; apothecial section K–.

WESTERN TATRA MTS. Tatra National Park: Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on stump, 15 June 2004, *L. Śliwa* 2204. SUB-TATRA TROUGH. Dolina Chochołowska valley, Siwa Polana glade, 49°16'40"N, 19°50'17"E (plot 65), alt. 920 m, intensive pasture, on bark of *Picea abies*, 19 June 2004, *L. Śliwa* 2509b. Tatra National Park: near Małe Ciche village, Wawrzeczkowa Cyrhla glade, 49°17'13"N, 20°03'32"E (plot 53), alt. 950 m, extensive pasture, on log, 16 June 2004, *L. Śliwa* 2270.

***Porpidia soredizodes*** (Lamy ex Nyl.) J. R. Laundon

This species is frequent and widespread in Poland (Jabłońska 2009), but only rarely recorded from the study area (Bielczyk 2003; Węgrzyn 2009). It is characterized by its grey, thin and often sterile thallus, usually urceolate or rarely tuberculate soralia, and the production of stictic acid (but sometimes it can be absent). Those characters distinguish it from stictic acid-containing *P. albocaerulescens* (Wulfen) Hertel & Knoph

(thallus with distinct beige tinge; Polish specimens always fertile with soralia tuberculate) and *P. superba* (Körb.) Hertel & Knoph f. *sorediata* Fryday (thallus creamy white, medium thick, continuous, smooth, but in Polish material areolate, cracked, soralia formed in the thallus cracks) (Jabłońska 2009, 2010).

CHEMISTRY. Stictic and norstictic (trace) acids.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Chochołowska glade, 49°14'16"N, 19°47'47"E (plot 64), alt. 1105 m, intensive pasture, on rock, 16 July 2004, *L. Śliwa* 3102; Dolina Chochołowska valley, Polana Dudowa glade, 49°14'58"N, 19°49'37"E (plot 24), alt. 1185 m, previously pastured, now abandoned land, on rock, 16 July 2004, *L. Śliwa* 3142; Dolina Chochołowska valley, Polana Huciska glade, 49°15'28"N, 19°49'19"E (plot 63), alt. 1025 m, intensive pasture, on rock, 19 June 2004, *L. Śliwa* 2625.

***Porpidia tuberculosa*** (Sm.) Hertel & Knoph

This is the commonest sorediate species of the genus in Poland, being widely distributed and known from most regions (Jabłońska 2009), but in the Tatra Mts it has been recorded from scattered localities (Bielczyk 2003; Flakus 2007; Jabłońska 2009). It can be distinguished by its production of confluent and 2'-O-methylperlatolic acids as major secondary metabolites and I+ blue medulla. The only other sorediate species containing those two substances is *P. melinodes* (Körb.) Gowan & Ahti, but its thallus is orange with a non-amyloid (I–) medulla (Jabłońska 2009, 2010).

CHEMISTRY. Confluent, 2'-O-methylperlatolic (trace), 2'-O-methylmicrophyllinic and porphyrillic acids; medulla I+ blue.

SPECIMENS EXAMINED. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, N of Pańszczykowa Polana glade, 49°17'40"N, 20°03'29"E (plot 15), alt. 920 m, forest with *Picea abies* and *Abies alba*, on rock, 24 July 2004, *L. Śliwa* 3319.

***Pycnora praestabilis*** (Nyl.) Hafeller

Previously, this species has only been reported from the Carpathians (High Tatra Mts) in Poland (Bielczyk 2003). *Pycnora praestabilis*

and *P. sorophora* are chemically identical, and in morphology they differ only in the production of soredia, being absent in the former; both form the so-called pair species (Timdal 1984). In our material we found several thalli producing only a very few soralia, perhaps indicative of an intermediate between *P. praestabilis* and *P. sorophora*, which may indicate that both taxa actually represent one species with two different reproductive modes; however, this must be determined by molecular analysis.

CHEMISTRY. Alectorialic acid with satellites.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Przysłop Chochołowski glade, 49°15'23"N, 19°48'10"E (plot 25), alt. 1200 m, previously pastured, now abandoned land, on wood of shepherd hut, 18, June, 2004, 49°14'58"N, 19°49'37"E, *L. Śliwa* 2432; Dolina Kościeliska valley, Polana Pisana glade, 49°14'33"N, 19°51'53"E (plot 21), alt. 1040 m, previously pastured, now abandoned land, on bark of *Picea abies*, 14 July 2004, *L. Śliwa* 2927; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies* and wood of shepherd hut, 15 July 2004, 49°15'48"N, 19°53'22"E, *L. Śliwa* 3020a, 3046. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on wood, 13 July 2004, *L. Śliwa* 2904.

### *Pycnora sorophora* (Vain.) Hafellner

This species is rather rare in Poland (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Czyżewska *et al.* 2005; Kubiak 2005; Fałtynowicz & Kukwa 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Kubiak *et al.* 2010), but perhaps only undercollected. In the Tatra Mts it has been noted by a few authors (see Bielczyk 2003), and more recently by Węgrzyn (2009).

CHEMISTRY. Alectorialic acid with satellites.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Jamy glade, 49°15'21"N, 19°49'15"E (plot 54), alt. 1085 m, 16, July, 2004, *L. Śliwa* 3182b; Dolina Chochołowska valley, Polana Przysłop Chochołowski glade, 49°15'23"N, 19°48'10"E (plot 25), alt. 1200 m,

previously pastured, now abandoned land, on wood of shepherd hut, 18 June 2004, *L. Śliwa* 2431; Dolina Kościeliska valley, Polana Pisana glade, 49°14'33"N, 19°51'53"E (plot 21), alt. 1040 m, previously pastured, now abandoned land, on bark of *Picea abies*, 14 July 2004, *L. Śliwa* 2929; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 15 July 2004, *L. Śliwa* 3020b; Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 17 June 2004, *L. Śliwa* 2403. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on bark of *Picea abies* and on shrubs, 17 July 2004, *L. Śliwa* 3256, 3281.

### *Ropalospora viridis* (Tønsberg) Tønsberg

This is a common species in Poland, but greatly under-recorded particularly in some areas (Fałtynowicz 2003; Kubiak 2005; Kossowska 2006). It is only rarely reported from the Carpathians (Bielczyk 2003; Czarnota 2010; Śliwa 2010), but perhaps overlooked. It is most likely to be confused with *Fuscidea pusilla*; for proper identification of these two taxa, TLC seems to be necessary, the latter species containing divaricatic acid as its major lichen substance and no perlatolic acid.

CHEMISTRY. Perlatolic acid.

SPECIMENS EXAMINED. SUB-TATRA TROUGH. Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on bark of *Abies alba*, 12 July 2004, *L. Śliwa* 2847. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on bark of *Abies alba*, 7 July 2004, *L. Śliwa* 2643.

### *!Scoliciosporum sarothamni* (Vain.) Vězda

This species has only recently, and so far infrequently, been reported from Poland (Fałtynowicz 2003; Kubiak 2005, 2009; Fałtynowicz & Kukwa 2006; Czarnota 2010; Kubiak *et al.* 2010). According to our knowledge, the records presented

below are only the second ones from southern part of the country (see Czarnota 2010). Superficially it can be mistaken for *S. chlorococcum* (Graewe ex Stenh.) Vězda or *S. gallurae* Vězda & Poelt as both also have developed similar convex apothecia in shades of brown; however, *S. chlorococcum* and *S. gallurae* produce fusiform ascospores (strongly curved to S-shaped in *S. sarothamni*); additionally, *S. chlorococcum* has a non-sorediate thallus (sorediate in *S. sarothamni*), whereas the thallus of *S. gallurae* is entirely sorediate (*S. sarothamni* develops discrete soralia) (Tønsberg 1992).

CHEMISTRY. Gyrophoric acid (trace).

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Kościeliska valley, Stare Kościeliska glade, 49°15'31"N, 19°52'08"E (plot 62), alt. 965 m, intensive pasture, on twigs of old shrubs of *Ribes*, 7 July 2004, *L. Śliwa 2674a*. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Brzanówka glade, mown grassland, 49°17'23"N, 20°05'21"E (plot 45), alt. 930 m, on bark of *Alnus incana*, 24 July 2004, *L. Śliwa 3360*.

### *Thelomma ocellatum* (Körb.) Tibell

This species is rather rare in Poland and rarely reported from the Carpathians and the Tatra Mts (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Kubiak 2005; Fałtynowicz & Kukwa 2006; Czarnota 2010). It is easily distinguished from other sterile crustose species by its grey thallus, blue-black or brown-black isidia and I+ blue medulla (Hitch & Purvis 2009).

CHEMISTRY. No substances detected; medulla I + blue.

SPECIMEN EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Lejowa valley, Niżnia Polana Kominiarska glade, 49°15'12"N, 19°50'54"E (plot 51), alt. 1140 m, extensive pasture, on wood of shepherd hut, 15 June 2004, *L. Śliwa 2130*.

### *Trapelia placodioides* Coppins & P. James

This species is perhaps common in the country, and also in the study area, but under-recorded (Bielczyk 2003; Fałtynowicz 2003; Kościelniak 2004; Kubiak 2005; Fałtynowicz & Kukwa 2006;

Szczepańska 2008; Czarnota 2010; Leśniański 2010; Śliwa 2010). Its thallus is whitish or pinkish, rimose, with a placodioid appearance, and its soralia are minute, usually arising from the edges of thallus cracks. Previously, it was mistaken in Poland for *T. obtegens* (Th. Fr.) Hertel, but its thallus consists of more or less scattered areoles (Purvis *et al.* 2009).

CHEMISTRY. Not tested; thallus C+ red.

SPECIMENS EXAMINED. WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Chochołowska glade, 49°14'16"N, 19°47'47"E (plot 64), alt. 1105 m, intensive pasture, on rock, 16 July 2004, *L. Śliwa 3064*. SUB-TATRA TROUGH. Tatra National Park: near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on rock, 13 July 2004, *L. Śliwa 2909b*; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'30"N, 20°03'35"E (plot 41), alt. 925 m, mown grassland, on stone, 16 June 2004, *L. Śliwa 2305*.

### *Trapeliopsis glaucolepidea* (Nyl.) Gotth. Schneid.

This is rarely reported species in Poland (Fałtynowicz 2003; Czarnota & Kukwa 2004; Kubiak 2005; Kukwa 2005; Kossowska 2006; Motiejūnaitė & Czyżewska 2008; Czarnota 2010; Kubiak *et al.* 2010), with so far only one locality (the Eastern Tatra Mts, Żabia Grań Mt.) known in the study area (Czarnota & Kukwa 2004). Its thallus consists of ascending, scattered or contiguous squamules with lip-shaped or ± capitate soralia produced at the apices of squamules. It is unlikely to be mistaken for any other lichen, but some forms of other members of the genus can develop thalli consisting of scattered, sometimes slightly squamulose areoles; those species however, contain gyrophoric acid and their thalli react C+ red (Purvis *et al.* 2009; Purvis & Smith 2009).

CHEMISTRY. Not tested; soralia and thallus C-.

SPECIMEN EXAMINED. SUB-TATRA TROUGH. Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on stump, 12 July 2004, *L. Śliwa 2856d*.



*Violella fucata* (Stirt.) T. Sprib.

syn. *Mycoblastus fucatus* (Stirt.) Zahlbr.

This species is frequent in Poland (e.g., Bielczyk 2003; Fałtynowicz 2003; Kubiak 2005; Kościelniak 2004; Łubek & Cieśliński 2004; Kossowska 2006; Łubek 2007; Szczepańska 2008; Czarnota 2010; Śliwa 2010); but, even so, under-recorded. Although there are several records from the study area (Bielczyk 2003; Krzewicka 2004a; Węgrzyn 2009), those presented here are the first confirmed by TLC. It can be separated from similar taxa (e.g., *Buellia griseovirens*) by its greyish-white to greenish-grey, areolate to continuous thallus, the greenish to blue-grey, convex to concave soralia, and the presence of atranorin and fumarprotocetraric acid as main secondary metabolites (Tønsberg 1992).

**CHEMISTRY.** Atranorin, fumarprotocetraric and protocetraric ( $\pm$ ) acids.

**SPECIMENS EXAMINED.** WESTERN TATRA MTS. Tatra National Park: Dolina Chochołowska valley, Polana Huciska glade, 49°15'32"N, 19°49'07"E (plot 42), alt. 1000 m, mown grassland, on bark of *Picea abies*, 19 June 2004, *L. Śliwa* 2552; Dolina Kościeliska valley, Przysłop Miętusi glade, 49°15'48"N, 19°53'22"E (plot 23), alt. 1160 m, previously pastured, now abandoned land, 15 July 2004, *L. Śliwa* 3017; Dolina Kościeliska valley, Wyżnia Miętusia Polana glade, 49°15'09"N, 19°53'44"E (plot 22), alt. 1160 m, previously pastured, now abandoned land, on bark of *Picea abies*, 17 June 2004, *L. Śliwa* 2344. SUB-TATRA TROUGH. Dolina Lejowa valley, Polana Biały Potok glade, 49°17'02"N, 19°50'48"E (plot 31), alt. 900 m, wet open habitat (bog), on bark of *Alnus incana*, 17 July 2004, *L. Śliwa* 3275; Tatra National Park: between Dolina Lejowa and Kościeliska valleys, above Polana Biały Potok glade, 49°16'40"N, 19°51'18"E (plot 14), alt. 930 m, forest with *Picea abies* and *Abies alba*, on bark of *Picea abies*, 12 July 2004, *L. Śliwa* 2841, 2873; near Małe Ciche village, Pańszczykowa Polana glade, 49°17'36"N, 20°03'36"E (plot 52), alt. 920 m, extensive pasture, on bark of *Picea abies*, 13 July 2004, *L. Śliwa* 2887, 2891; near Małe Ciche village, small opening NW of Brzanówka glade, 49°17'29"N, 20°05'09"E (plot 35), alt. 920 m, wet open habitat (bog), 24 July 2004, *L. Śliwa* 3338.

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