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THE GENUS *LEPRARIA* (LICHENIZED ASCOMYCOTA) IN THE BESKID SĄDECKI MTS (WEST CARPATHIANS, S POLAND)

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Abstract. A comprehensive analysis of the species diversity and distribution of *Lepraria* Ach. in part of the Polish Carpathians is presented. The treatment is based on morphological and chemical examination of a large collection of the genus originating from the Beskid Sądecki Mts. Thirteen species occur in the region: *L. borealis* Lohtander & Tønsberg, *L. caesioalba* (de Lesd.) J. R. Laundon, *L. crassissima* (Hue) Lettau, *L. diffusa* (J. R. Laundon) Kukwa, *L. eburnea* J. R. Laundon, *L. elobata* Tønsberg, *L. incana* (L.) Ach., *L. jackii* Tønsberg, *L. lobificans* Nyl., *L. membranacea* (Dicks.) Vain., *L. neglecta,* (Nyl.) Erichsen, *L. rigidula* (de Lesd.) Tønsberg and *L. vouauxii* (Hue) R. C. Harris. Distribution maps are provided for all species, and their habitat requirements and general distribution in Poland and the Carpathians are discussed. New records for several Carpathian regions are supplied.

Key words: *Lepraria*, distribution, habitat, Beskid Sądecki Mts, Carpathians, Poland

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INTRODUCTION

The lichen genus *Lepraria* Ach. consists of persistently sterile crustose sorediate species. The genus was long considered to be polyphyletic, with an unknown systematic position (Poelt 1987). Recent molecular studies have shown, however, that most species form a monophyletic group close to *Stereocaulon* Hoffm. within the order Lecanorales (Ekman & Tønsberg 2003).

Although the members of the genus are common constituents of the lichen biota in temperate regions, in many areas they have not been thoroughly investigated. The taxon has been described for the British Isles (Laundon 1992), Norway (Tønsberg 1992, 2002), Finland (Lohtander 1994, 1995), southernmost Sweden (Lindblom 1995), Baden-Württemberg in Germany (Wirth & Heklau 1995), Estonia (Saag & Saag 1999) and Sardinia (Zedda 2000). For many European countries only single records are published (e.g., Litterski 1997; Grube *et al*. 1998; Bayerová & Kukwa 2004). Though regional studies of the genus are few, secondary metabolites of many *Lepraria* species have been investigated in detail (see Kümmerling *et al*. 1991, 1993, 1995a, b; Leuckert & Kümmerling 1991; Leuckert *et al*. 1995). Lichen compounds are currently one of the most important diagnostic characters within the genus.

In Poland the genus was recently studied by Kukwa (2003a), but only some of the *Lepraria* specimens from the Beskid Sądecki Mts were covered. Lichenological research in the Beskid Sądecki Mts (Fig. 1) began at the end of the 19th century (Rehman 1879; Boberski 1886, 1892). The lichen biota of the area was thoroughly investigated by Olech (1972, 1973). At the end of the 1980s a comparative survey was undertaken in the Beskid Sądecki Mts in order to determine the impact of human activity on the diversity and distribution of lichens there (Śliwa 1998). The very rich material of *Lepraria* collected from many sites in the region at that time provides a sufficient basis for a comprehensive analysis of the diversity and distribution of the representatives of that genus in this part of the Carpathians.

Materials and methods

The *Lepraria* material included in the present paper was collected by the second author in 1989–1991. Previously, for the author's comparative treatment (Śliwa 1998), the *Lepraria* specimens were divided into three taxa (distinguished by earlier lichen investigators in the area, e.g., Olech 1973): *L. aeruginosa* auct. s.l., *L. neglecta* (Nyl.) Erichsen and *Leproloma membranaceum* (Dicks.) Vain. In 2001–2003 the collection of over 300 specimens was reexamined in terms of the current taxonomic status of the genus, applying thin layer chromatography (TLC methods followed Orange *et al*. 2001).

Voucher specimens from the Beskid Sądecki Mts were collected by Lucyna Śliwa and are deposited in the herbarium of the Institute of Botany of the Jagiellonian University (KRA), with several duplicates in the herbarium of the W. Szafer Institute of Botany of the Polish Academy of Sciences (KRAM), Kraków.

The distribution of species in Poland and in the Carpathians is given based exclusively on the revised materials, the identification of which is supported by TLC analyses of secondary metabolites. For previously unpublished regional Carpathian records, additional specimens examined are listed.

Results

Lepraria borealis Lohtander & Tønsberg

The species was recently reported from Poland by Czarnota and Kukwa (2001), and later recognized from several sites in the Carpathians, Sudetes and Góry Świętokrzyskie Mts (Kukwa 2003a, b). It seems to be rare species in Poland, but might be overlooked in some regions. *Lepraria borealis* is a mountain species occurring at *ca* 600–1500 m a.s.l. It prefers rather sunny habitats and usually grows on rocks or saxicolous mosses, rarely on other substrates (Kukwa 2003a).

Lepraria borealis is very rare and probably endangered in the studied area. The species was found on rocks, associated with *L. incana* and on soil (Fig. 2).

Distribution in the West Carpathians. Pogórze Wiśnickie foothills, Pogórze Ciężkowickie foothills, Pogórze Dynowskie foothills, Beskid Mały Mts, Beskid Makowski Mts (see additional specimens examined), Gorce Mts (Czarnota & Kukwa 2001), Tatry Wysokie Mts (Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

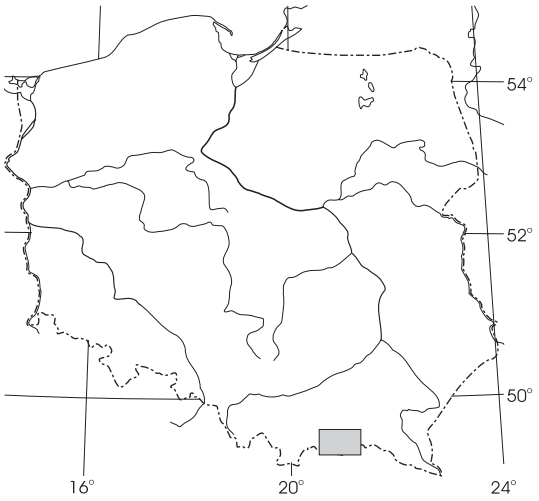

Fig. 1. Location of the study area.

Distribution in the East Carpathians. Bieszczady Zachodnie Mts (see additional specimens examined).

Specimens examined. West Carpathians. Beskid Sądecki Mts, Jaworzyna Krynicka Range: Hala Krajnia glade, alt. 1000 m, on overshaded rocks (assoc. with *L. incana*), 13 June 1991; Zadnie Góry Mt., alt. 820 m, on soil, 4 July 1989 (as *L. neglecta* in Śliwa 1998).

Additional specimens examined. West Carpathians. Pogórze Wiśnickie foothills: Bigorzówka near Raciechowice, Kamień Grzyb sandstone tor, on soil between bryophytes, 7 May 2000, *L. Śliwa 1119a* (KRAM); Pogórze Ciężkowickie foothills: Skamieniałe Miasto Reserve, Borsuk sandstone tor, on saxicolous mosses, 26 June 2001, *L. Śliwa 1481* (KRAM); Pogórze Dynowskie foothills: Prządki Reserve, alt. 460–520 m, on sandstone, 5 May 1999, *L. Śliwa & B. Krzewicka s.n.* (KRAM-L 49678); Beskid Mały Mts: Solnisko, alt. 750 m, on sandstone, 10 Aug. 1960, *J. Nowak* (KRAM-L 7891); Beskid Makowski Mts: Pcim, Druzgałowa hamlet, alt. 600 m, on sandstone, 24 Aug 1996, *J. Nowak* (KRAM-L 43035). – East Carpathians. Bieszczady Zachodnie Mts: Smerek Mt., alt. 1100 m, on saxicolous mosses, 19 June 1956, *K. Glanc* (KRAM-L 38854); Tarnica Mt., alt.

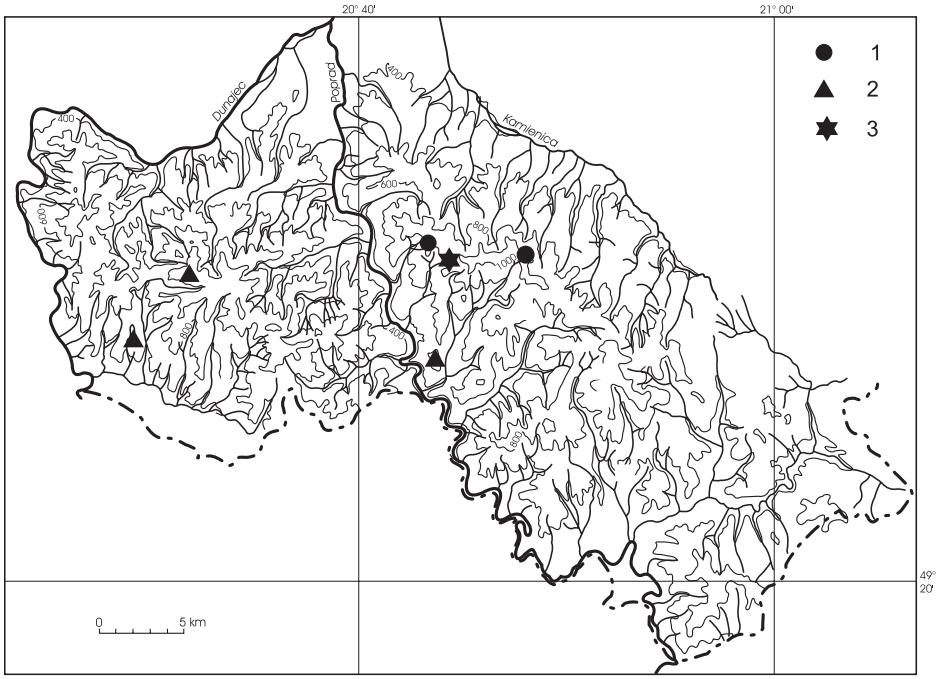

Fig. 2. *Lepraria borealis* Lohtander & Tønsberg (1), *L. caesioalba* (de Lesd.) J. R. Laundon (2) and *L. neglecta* (Nyl.) Erichsen (3) in the Beskid Sądecki Mts.

1330 m, on saxicolous mosses, 25 Aug. 1957, *K. Glanc* (KRAM-L 49681).

Lepraria caesioalba (de Lesd.) J. R. Laundon

The first documented records of the species in Poland were supplied by Czarnota and Kukwa (2001) and Śliwa *et al.* (2001). *Lepraria caesioalba* is a mountain species occurring in the Carpathians and Sudetes at *ca* 600–1800 m. It prefers open habitats and grows on saxicolous mosses and noncalcareous rocks (Kukwa 2003a, b, 2004b). In Norway the species was also reported to grow on tree bark (Tønsberg 1992).

In the Beskid Sądecki Mts *L. caesioalba* is a rare saxicolous lichen (Fig. 2). Two of three known chemotypes of the species were found in the studied area: (I) containing fumarprotocetraric acid as the main depsidone, and (III) with psoromic acid (see Leuckert *et al.* 1995).

DISTRIBUTION IN THE WEST CARPATHIANS. Beskid Żywiecki Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Wiśnickie foothills (Śliwa *et al.* 2001), Gorce Mts (Czarnota & Kukwa 2001), Tatry Wysokie Mts (Krzewicka 2004, Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al*. 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (see additional specimens examined).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: Bryjarka hill, alt. 650 m, on andesite rocks, 6 June 1991 [chemotype III]; Skałka Szczawnicka Mt., alt. 1160 m, on sunny side of rocks, 1 Sept. 1990 [chemotype I]; JAWORZYNA KRYNICKA RANGE: Kicarz Mt., alt. 700 m, on rock, 29 Apr. 1989 [chemotype III] (as *L. neglecta* in Śliwa 1998).

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID ŻYWIECKI MTS: Wielka Racza range, below Łysica Mt., on saxicolous mosses, 5 Aug. 1964, *J. Nowak s.n.* [chemotype III] (KRAM-L 14435); BESKID NISKI MTS: valley of Folusz stream, Diabli Kamień monument, on rock, 8 Sept. 1954, *T. Sulma s.n.* [chemotype III] (UGDA). – EAST CARPATHIANS. BIESZCZADY ZACHODNIE MTS: Smerek

Mt., alt. 1100 m, on saxicolous mosses, 19 June 1956, *K. Glanc s.n.* [chemotype I] (KRAM-L 23321); Tarnica Mt., alt. 1330 m, on saxicolous mosses, 25 Aug. 1957, *K. Glanc s.n.* [chemotype I] (KRAM-L 49680).

Lepraria crassissima (Hue) Lettau

It is a rather rare species in Poland, known only from the southern part of the country (Kukwa 2003a, b). Its distribution is related mostly to limestone and gypsum outcrops. Rarely it grows on other types of rocky substrate and on soil (Czarnota & Kukwa 2001; Kukwa 2002a, 2003a, b, 2004b). In Estonia it was found also on tree bark (Saag & Saag 1999).

The species is rare in the Beskid Sądecki Mts and occurs exclusively on rocks (Fig. 3).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Wiśnickie foothills, Pogórze Ciężkowickie foothills, Beskid Niski Mts (see additional specimens examined), Gorce Mts (Czarnota & Kukwa 2001), Tatry Wysokie Mts (Kukwa 2004b).

DISTRIBUTION IN THE EAST CARPATHIANS. The species is reported from Ukraine (Kukwa 2000).

SPECIMENS EXAMINED.WEST CARPATHIANS. BESKID SĄDECKI MTS, JAWORZYNA KRYNICKA RANGE: Góra Skała Mt. near Kokuszka, alt. 770 m, on overshaded rocks (assoc. with *L. lobificans*), 25 Feb. 1990; valley of Łomniczanka stream, alt. 390 m, on rocks, 4 Aug. 1989. Additional record of the species from Żebracze Reserve is published by Czarnota (2002).

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE WIŚNICKIE FOOTHILLS: Kamienie Brodzińskiego Nature Monument near Rajbrot, alt. 430 m, on sandstone, 8 Nov. 1999, *L. Śliwa & B. Krzewicka s.n.* (KRAM-L 49674); POGÓRZE CIĘŻKOWICKIE FOOTHILLS: Wąwóz Wodospad Nature Monument near Ciężkowice, on rocks, 26 June 2001, *L. Śliwa 1492* (KRAM); BESKID NISKI MTS: valley of Folusz stream, Diabli Kamień monument, on rock, 13–16 June 1957, *T. Sulma s.n.* (UGDA).

Lepraria diffusa (J. R. Laundon) Kukwa

In Poland the species has so far been noted exclusively from the Carpathians and from the Wyżyna Śląsko-Krakowska upland (Kukwa 2003a, b). The typical variety of *L. diffusa* was reported for the first time from the Gorce Mts (Czarnota & Kukwa 2001 and literature cited there), and recently *L. diffusa* var. *chrysodetoides* (J. R. Laundon) Kukwa was recorded from the same area (Czarnota & Kukwa 2004). *Lepraria diffusa* is a rare species in Poland, growing on rocks (also on saxicolous mosses) and rarely on clayey soil (Kukwa 2003a, b). Outside Poland, *L. diffusa* is exceptionally reported on tree bark (e.g., Zedda 2000). According to Zedda (2000), the species, together with *Lobaria pulmonaria* (L.) Hoffm. and *Thelotrema lepadinum* (Ach.) Ach., is an indicator of old growth oak woods in Sardinia. In Poland, however, the taxon seems to prefer various habitats and should not be considered an indicator lichen.

In the Beskid Sądecki Mts, *L. diffusa* was collected at two sites. One specimen represents *L. diffusa* var. *chrysodetoides*, characterized by its greenish-yellow thallus. The second one was small and partly damaged, but probably belongs to the typical variety, being whitish to greyish in color.

Lepraria diffusa is very rare and probably endangered in the studied area. It occupies rock surfaces (Fig. 3).

DISTRIBUTION IN THE WEST CARPATHIANS. Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001, Czarnota & Kukwa 2004); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Unknown.

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: Kamień Św. Kingi monument, alt. 1000 m, on calcareous rock, 31 Aug. 1990 (var. *chrysodetoides*); JAWORZYNA KRYNICKA RANGE: valley of Szczawnik stream, alt. 640 m, on rock, 3 Aug. 1989 (cf. var. *diffusa*).

Lepraria eburnea J. R. Laundon

The species was reported as new to Poland by Kukwa and Sągin (2001) from scattered sites in northern Poland and from the Wyżyna Częstochowska upland. *Lepraria eburnea* is not very common in Poland, but might be undercollected (Kukwa 2002a, 2003a, b). The species has a rather wide habitat amplitude, but prefers me-

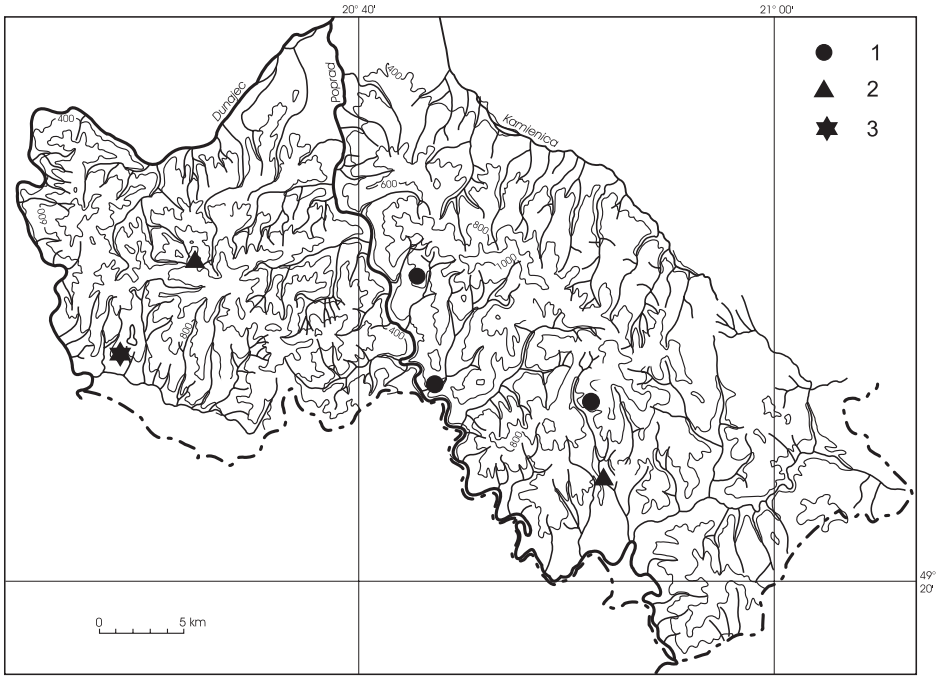

Fig. 3. *Lepraria crassissima* (Hue) Lettau (1), *L. diffusa* (J. R. Laundon) Kukwa (2) and *L. membranacea* (Dicks.) Vain. (3) in the Beskid Sądecki Mts.

dium acidic to basic substrates (Kukwa 2003a). Two chemotypes of the species are reported from Poland: (I) with alectorialic acid ± with associated substances, and with protocetraric acid; and (III) with only alectorialic acid ± with associated substances (see Orange 1997; Kukwa & Sągin 2001).

Both chemical races were discovered in the Beskid Sądecki Mts, but the chemotype of six specimens could not be determined because they were too small or grew together with other *Lepraria* species.

Lepraria eburnea seems relatively common in this area, growing on a wide range of substrates: rocks, bark of *Fagus sylvatica* and *Abies alba*, bark of stumps, and soil (Fig. 4).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Wiśnickie foothills, Beskid Żywiecki Mts, Beskid Makowski Mts (see additional specimens examined), Pogórze Śląskie foothills (see Bielczyk 2003), Pogórze Dynowskie foothills (Krzewicka & Śliwa 2000), Gorce Mts (Czarnota & Kukwa 2001), Tatry Zachodnie Mts (Kukwa 2004b); the species is also reported from Hungary and Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (Kiszka & Kościelniak 2001a); the species is also reported from Ukraine (Kukwa 2000).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: valley of Czercz stream, alt. 850 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata* and *L. lobificans*), 4 Aug. 1990; Kamień Św. Kingi monument, alt. 1050 m, on rocks (assoc. with *L. rigidula*), 6 Aug. 1990 [chemotype I]; Kłodne nad Dunajcem Reserve, alt. 580–600 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 30 Aug. 1990 [chemotype I]; valley of Kotelniczy stream, alt. 800 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata* and *L. jackii*), 31 Aug. 1990; valley of Potok Młodowski stream, alt. 640 m, on bark of *Abies alba* (assoc. with *L. lobificans*), 20 July 1990; Niemcowa colony, alt. 920 m, on bark of log (assoc. with *L. elobata*), 4 May 1990; valley of Sopotnicki stream, alt. 840 m, on rocks, 3 May 1991 [chemotype I]; valley of Wielka Roztoka stream, alt.

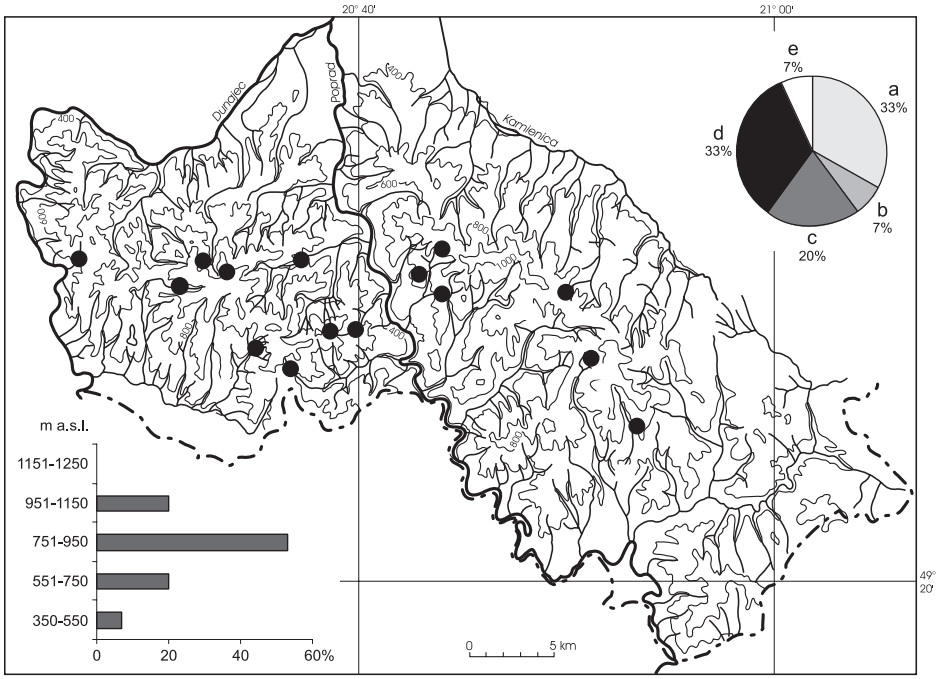

Fig. 4. *Lepraria eburnea* J. R. Laundon in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks, e – soil.

460 m, on rocks, 21 July 1990 [chemotype III]; Zgrzypy Mt, alt. 970 m, on bark of stump (assoc. with *L. elobata* and *L. jackii*), 1 Apr. 1991; JAWORZYNA KRYNICKA RANGE: Góra Skała Mt. near Kokuszka, alt. 770 m, on sunny side of rocks (assoc. with *L. jackii*), 16 June 1990 [chemotype I]; near Jarzębaki colony, alt. 670 m, on soil (assoc. with *L. lobificans*), 4 Aug. 1989 [chemotype I]; peak of 834 m a. s. l., SE of Jaworzyna Mt., alt. 840 m, on bark of log (assoc. with *L. elobata*), 25 Apr. 1989 *L. Śliwa s.n.*; Łabowiec Reserve, alt. 960 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 13 June 1991; well-head of Szczawnik stream, alt. 920 m, on bark of *Fagus sylvatica*, 7 Sept. 1989 [chemotype I] (assoc. with *L. elobata* and *L. jackii*); Zadnie Góry Mt., alt. 800 m, on stones overgrown by mosses, 4 July 1989.

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE WIŚNICKIE FOOTHILLS: Leszczyna, W of the road juntion to Rozstaje, trees along the road side, on bark of *Salix*, 30 June 2000, *L. Śliwa 1262* (KRAM); Łapanów, at the road to Muchówka, trees along the road side, on bark of *Fraxinus excelsior*, 3 June 1998, *L. Śliwa 774a* (KRAM); Sieradzka, forest along the stream, on bark of stump, 20 June 2000, *L. Śliwa 1222* (KRAM); BESKID ŻYWIECKI MTS: Mała Babia Góra Mt., alt. 1050 m, on bark of *Fagus sylvatica*, 28 Aug. 1976, *U. Bielczyk s.n.* (specimen of *Lepraria lobificans*: KRAM-L–43903); Pilsko range, Jeleńce-Gajka, by the bridge on Suseński stream, alt. 480 m, on rock and saxicolous mosses, 23 Sept. 1964, *J. Nowak s.n.* [chemotype I] (KRAM-L 16773); BESKID MAKOWSKI MTS: Pcim, Mizerówka hamlet, by Krzywiczanka stream, alt. 340 m, on bark of *Salix*, 22 Aug. 1996, *J. Nowak s.n.* [chemotype I] (KRAM-L 42968).

Lepraria elobata Tønsberg

The species was found for the first time in Poland by Kukwa and Owe-Larsson (2000), who reported it from one site in the Tatry Wysokie Mts and several sites in northern Poland. *Lepraria elobata* is considered to be one of the most common species of the genus in Poland (Kukwa 2003a, b), especially in mountain areas (Czarnota & Kukwa 2001; Kukwa 2004b). The species is also common in lowland, but *L. incana* is even more frequent there (see Kukwa 2001, 2002a). *Lepraria elobata* prefers acidic, meso- to oligotrophic bark of trees. Rarely it occupies noncalcareous rocks, soil and

wood. It is worth noting that the species occurs almost exclusively in forests. Only rarely does it grow on freestanding trees close to woodlands (Kukwa 2003a, b).

Lepraria elobata is the most common species in the Beskid Sądecki Mts. It grows frequently on bark of deciduous trees, but was also found on other types of substrates such as bark of coniferous trees, bark of stumps and logs, wood, soil and rocks (Fig. 5).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Spisko-Gubałowskie foothills, Pogórze Ciężkowickie foothills, Beskid Mały Mts, Beskid Żywiecki Mts, Beskid Makowski Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Śląskie foothills (see Bielczyk 2003), Pogórze Wiśnickie foothills (Śliwa & Krzewicka 2004), Gorce Mts (Czarnota & Kukwa 2001), Tatry Wysokie Mts (Kukwa & Owe-Larsson 2000; Krzewicka 2004; Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (Kiszka & Kościelniak 2001a); the species is also reported from Ukraine (Kondratyuk *et al*. 2003).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: well-head of Brzynka stream, alt. 750 m, on bark of log, 16 May 1991; Bziniaki colony, alt. 690 m, on soil, 4 May 1990; valley of Czarna Woda stream, alt. 700 m, on bark of *Picea abies*, 31 Aug. 1990; alt. 700 m, on soil (assoc. with *L. lobificans*), 31 Aug. 1990; valley of Czercz stream, alt. 630 m, on bark of *Abies alba*, 21 Feb. 1990; alt. 700 m, on bark of *Abies alba* (assoc. with *L. incana* and *L. lobificans*), 21 Feb. 1990; alt. 750 m, on log (assoc. with *L. incana*), 4 Aug. 1990; alt. 770 m, on bark of *Fagus sylvatica* (assoc. with *L. jackii*), 4 Aug. 1990; alt. 850 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. lobificans*), 4 Aug. 1990; Dzwonkówka Mt., alt. 980 m, heap of rubble, 12 Aug. 1990; alt. 980 m, on bark of *Fagus sylvatica*, 12 Aug. 1990; Kłodne nad Dunajcem Reserve, alt. 510 m, on bark of *Fagus sylvatica*, 30 Aug. 1990; alt. 580–600 m, on overshaded rocks (assoc. with *L. eburnea*), 30 Aug. 1990; valley of Kotelniczy stream, alt. 800 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. jackii*), 31 Aug. 1990; between Krościenko town and Dzwonkówka Mt., alt. 800 m, on stone, 12 Aug. 1990; alt. 840 m, on bark of *Fagus sylvatica*, 29 Aug. 1990; alt. 860 m, on decaying wood of stump, 29 Aug. 1990; valley of Mała Roztoka stream, alt. 550 m, on bark of *Fraxinus excelsior*, 23 July 1990; Niemcowa colony, alt. 870 m, on bark of *Abies alba* (assoc. with *L. jackii*), 4 May 1990; alt. 870 m, on bark of log, 4 May 1990; alt. 920 m, on bark of log (assoc. with *L. eburnea*), 4 May 1990; peak of 1026 m a. s. l., above Niemcowa colony, alt. 1080 m, on bark of *Fagus sylvatica* (assoc. with *L. rigidula*), 22 July 1990; Obłazy Ryterskie, alt. 610 m, on stone, 4 May 1990; valley of Potok Biały stream, alt. 760 m, on bark of *Fagus sylvatica*, 6 June 1991; valley of Potok Kozłecki stream, alt. 730 m, on bark of *Fagus sylvatica*, 29 Aug. 1990; valley of Potok Młodowski stream, alt. 520 m, on bark of *Fagus sylvatica*, 20 July 1990; valley of Potok Obidzki stream, alt. 780 m, on bark of *Prunus*, 1 Sept. 1990; peak of 1192 m a. s. l., near Przehyba pass, alt. 1140 m, on bark of *Picea abies* (assoc. with *L. jackii*), 22 July 1990; Przehyba pass, near tourist hostel, alt. 1140 m, on bark of *Sorbus aucuparia*, 6 Aug. 1990; alt. 1170 m, on bark of *Picea abies* (assoc. with *L. jackii*), 6 Aug. 1990; Radziejowa Mt., north slope, alt. 1000 m, on bark of *Acer*, 23 July 1990; valley of Rogacz stream, alt. 860 m, on stump, 5 Aug. 1990; alt. 870 m, on bark of *Picea abies*, 5 Aug. 1990; between Ruski Wierch Mt. and Wielki Rogacz Mt., alt. 940 m, on bark of *Fagus sylvatica* (assoc. with *L. rigidula*), 3 May 1990; Skalskie in upper part of Pod Górami stream, alt. 1000 m, on bark of *Fagus sylvatica*, 5 Aug. 1990; Skalskie in upper part of Pod Górami stream, alt. 1050 m, on bark of *Picea abies*, 5 Aug. 1990; Skałka Szczawnicka Mt., alt. 1100 m, on bark of log (assoc. with *L. elobata*), 6 Aug. 1990; valley of Stary stream, alt. 690 m, on bark of stump, 2 May 1991; alt. 790 m, on bark of *Fagus sylvatica*, 2 May 1991; alt. 1070 m, on bark of *Fagus sylvatica* (assoc. with *L. jackii*), 2 May 1991; valley of Wielka Roztoka stream, alt. 470 m, on bark of *Abies alba* (assoc. with *L. jackii*), 21 July 1990; alt. 490 m, on bark of *Fraxinus excelsior* (assoc. with *L. rigidula*), 21 July 1990; alt. 500 m, bark of *Acer*, 21 July 1990; Wielki Rogacz Mt., alt. 1020 m, on bark of *Picea abies* (assoc. with *L. jackii*), 21 Feb. 1990; alt. 1150 m, on bark of *Fagus sylvatica* (assoc. with *L. jackii*), 22 July 1990; Wietrzne Dziury Mt., alt. 960 m, on bark of *Acer* (assoc. with *L. rigidula*), 21 July 1990; Zgrzypy Mt., alt. 970 m, on bark of log (assoc. with *L. eburnean* and *L. jackii*), 1 May 1991; alt. 1050 m, on bark of *Acer*, 1 May 1991; Złomisty Wierch Mt., alt. 1200 m, on bark of *Fraxinus excelsior* (assoc. with *L. jackii*), 22 July 1990; JAWORZYNA KRYNICKA RANGE: valley of Czaczowiec stream, alt. 830 m, on soil, 10 Aug. 1989; Czerteź area (upper most part of Łomniczanka

stream), alt. 950 m, on bark of *Fagus sylvatica*, 9 Aug. 1989; valley of west slope of Góra Sokołowska Mt., alt. 880 m, on bark of log, 17 Aug. 1989; Hala Krajnia glade, alt. 980 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 10 Aug. 1989; Hala Łabowska glade, alt. 1050 m, on bark of *Fagus sylvatica* (assoc. with *L. rigidula*), 27 May 1989; Hala Szczawnik glade, alt. 1000 m, on bark of *Fagus sylvatica*, 7 Sept. 1989; Homerka stream, alt. 500 m, on bark of *Salix* (assoc. with *L. lobificans*), 16 Aug. 1989; peak of 834 m a. s. l., south east of Jaworzyna Mt., alt. 840 m, on bark of log (assoc. with *L. eburnea*), 25 May 1989; Jaworzyna Mt., alt. 1050 m, on bark of *Fagus sylvatica*, 26 May 1989; alt. 1080 m, on bark of *Fagus sylvatica*, 26 May 1989; between Jaworzyna Mt. and Runek Mt., alt. 960 m, on bark of log, 5 Sept. 1989; alt. 1020 m, on bark of *Fagus sylvatica*, 26 May 1989; alt. 1050 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 26 May 1989; glade below top of Jaworzynka Mt., alt. 850 m, on bark of *Fagus sylvatica*, 5 Aug. 1989; Jaworzynka Mt., alt. 920 m, on bark of *Fagus sylvatica*, 4 June 1989; south slope of Jaworzyna Mt., alt. 970 m, on bark of *Picea abies* (assoc. with *L. jackii*), 26 May 1989; valley of Jaworzynka stream, alt. 550 m, on bark of *Fagus sylvatica*, 3 July 1989; alt. 580 m, on soil, 3 July 1989; alt. 600 m, on bark of *Picea abies*, 12 June 1991; Juchówka area in upper most part of Potasznia stream, alt. 940 m, on bark of *Fagus sylvatica* (assoc. with *L. jackii*), 3 June 1989; Kicarz Mt., alt. 680 m, on bark of stump, 29 Apr. 1989; Makowica Mt., alt. 900 m, on bark of *Fagus sylvatica*, 2 Aug. 1989; valley of Kryściów stream, alt. 570 m, on bark of *Abies alba*, 8 Apr. 1989; Łabowiec Reserve, alt. 920 m, on decaying wood of stump (assoc. with *L. incana* and *L. jackii*), 13 June 1991; alt. 960 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea*), 13 June 1991; Łomnica, alt. 500 m, on bark of *Fraxinus excelsior*, 4 Aug. 1989; alt. 520 m, on bark of *Fraxinus excelsior*, 10 July 1989; trail from Łomnica to Parchowatka Mt., alt. 800 m, on bark of *Juniperus* (assoc. with *L. lobificans*), 10 July 1989; glade above valley of Łomnicka stream, alt. 870 m, on rocks, 4 Aug. 1989; valley of Łomniczanka stream, alt. 550 m, on bark of log, 4 Aug. 1989; alt. 700 m, on bark of *Fagus sylvatica*, 6 Aug. 1989; alt. 710 m, on bark of *Abies alba*, 10 July 1989; valley of Łosiański Potok stream, alt. 680 m, on bark of *Fagus sylvatica* (assoc. with *L. vouauxii* and *L. lobificans*), 9 Apr. 1989; Makowica Mt., alt. 930 m, on bark of *Fagus sylvatica*, 28 May 1989; near Nad Wierchomlą tourist hostel, alt. 850 m, on overshaded rocks (assoc. with *L. lobificans*), 4 June 1989; alt. 900 m, on bark of stump, 3 June 1989; Ostra Mt., alt. 700 m, on soil, 9 Aug. 1989; above Palenica colony, alt. 810 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 7 July 1989; Parchowatka Mt., alt. 980 m, on bark of *Fagus sylvatica*, 10 July 1989; Pisana Hala glade, alt. 930 m, on bark of *Abies alba*, 3 July 1989; valley of Potasznia stream, alt. 580 m, on bark of *Picea abies*, 6 July 1989; alt. 620 m, on bark of *Abies alba* (assoc. with *L. jackii*), 6 Sept. 1989; alt. 650 m, on bark of *Fagus sylvatica*, 6 Sept. 1989; alt. 800 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 6 Sept. 1989; alt. 840 m, on bark of stump, 3 June 1989; alt. 880 m, on bark of log (assoc. with *L. rigidula*), 3 June 1989; valley of Potok Feleczyn stream, alt. 900 m, on stone, 7 Aug. 1989; valley of Potok Składziszczański stream, alt. 790 m, on bark of *Pinus sylvatica* (assoc. with *L. jackii*), 11 Aug. 1989; valley of Potok Uhryński stream, alt. 810 m, on bark of *Fagus sylvatica*, 8 Aug. 1989; alt. 900 m, on bark of *Fagus sylvatica*, 8 Aug. 1989; Przełęcz Krzyżowa pass, alt. 770 m, on bark of log, 14 July 1989; Runek Mt., alt. 1000 m, on bark of *Picea abies* (assoc. with *L. jackii*), 27 May 1989; alt. 1060 m, on bark of *Fagus sylvatica*, 8 Sept. 1989; alt. 1080 m, on bark of *Sorbus aucuparia* (assoc. with *L. jackii*), 26 May 1989; between Runek Mt. and Kryściów stream, alt. 950 m, on soil, 27 May 1989; Sarnica area (south of Pisana Hala glade), alt. 970 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 4 Aug. 1989; glade below Skotarki area, alt. 870 m, on bark of *Fagus sylvatica*, 10 July 1989; Skotarki area (south of Hala Łabowska glade), alt. 990 m, on stone, 10 July 1989; valley of Szczawniczek stream, alt. 660 m, on bark of *Fagus sylvatica*, 5 Sept. 1989; valley of Szczawnik stream, alt. 630 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 3 Aug. 1989; alt. 900 m, on bark of log, 7 Sept. 1989; well-head of Szczawnik stream, alt. 920 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. jackii*), 7 Sept. 1989; alt. 950 m, on bark of log, 7 Sept. 1989; Wierchomla Mała, alt. 580 m, on bark of log, 4 Sept. 1989; above Wierchomla Mała, alt. 600 m, on bark of *Abies alba*, 4 Sept. 1989; Wyżne Młaki pass (north of Pusta Wielka Mt.), alt. 870 m, on bark of *Picea abies*, 4 June 1989; Zadnie Góry colony, alt. 780 m, on stone, 3 July 1989; Zadnie Góry Mt., alt. 900 m, heap of rubble, 3 July 1989; Żegiestów, alt. 620 m, on bark of *Fagus sylvatica* (assoc. with *L. incana*), 5 Aug. 1989; Żegiestów Zdrój, alt. 410 m, on bark of *Betula*, 7 July 1989; alt. 450 m, on bark of *Tilia cordata*, 7 July 1989. Additional records of the species are published by Czarnota (2002) from Żebracze Reserve.

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE SPISKO-GUBAŁOWSKIE FOOTHILLS:

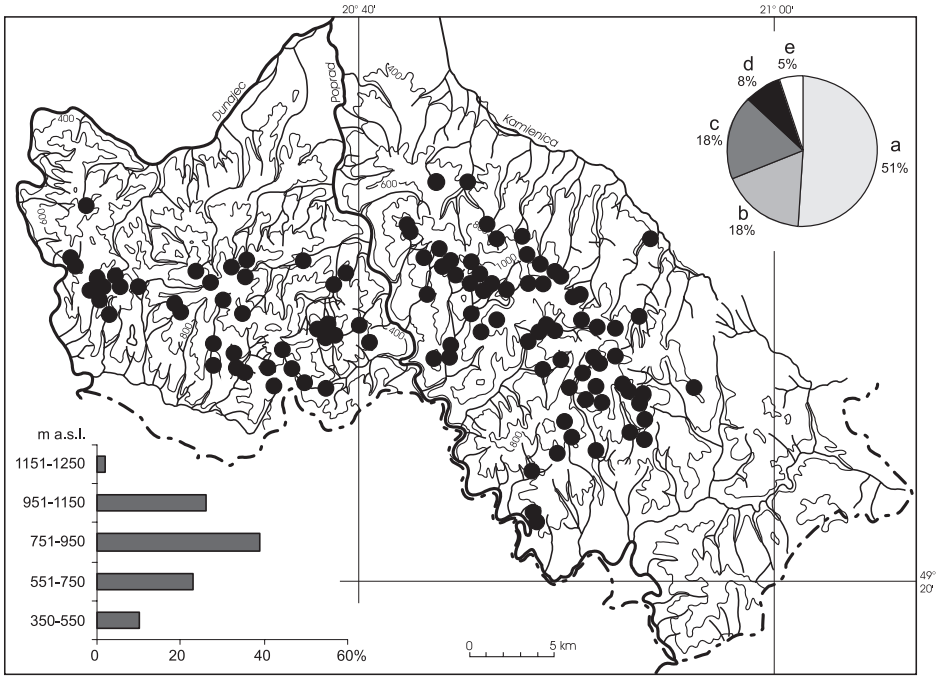

Fig. 5. *Lepraria elobata* Tønsberg in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks, e – soil.

Gubałówka Mt., on bark of *Picea abies*, 6 Aug. 1957, *T. Sulma s.n.* (UGDA); Pogórze Ciężkowickie foothills: Skamieniałe Miasto Reserve, Czarownica sandstone tor, on rock, 26 June 2001, *L. Śliwa 1454* (KRAM); Beskid Mały Mts: Hrobacza Łąka, alt. 800 m, on bark of *Pinus sylvestris*, 23 Aug. 1960, *J. Nowak s.n.* (KRAM-L 7890); Kocierz Moszczanicki, alt. 800 m, on soil, 7 June 1996 J. Nowak *s.n.* (KRAM-L 43425); trail from Potrójna Mt. to Przełęcz Kocierska pass, alt. 750 m, on bark of stump, 8 June 1996, *J. Nowak s.n.* (KRAM-L 43511); Beskid Żywiecki Mts: Babia Góra Mt., vicinity of Pański Chodnik, alt. 1640 m, on soil, 14 Sept. 1997, *P. Górski s.n.* (UGDA); Pasmo Jałowca range, Ostra Górka Mt., alt. 610 m, on bark of *Fagus sylvatica*, 3 Sept. 1965, *J. Nowak s.n.* (KRAM-L 15407); Pilsko range, E slope of Kotarnica Mt., on bark of *Picea abies*, 18 June 1966, *J. Nowak s.n.* (KRAM-L 17074), Pilsko Reserve, alt. 1300 m, 28 Sept. 2003, *L. Śliwa 2108* (KRAM); Romanka Mt., alt. 1320 m, on bark of *Picea abies*, 30 Aug. 1973, *U. Bielczyk s.n.* (KRAM-L 41881); Beskid Makowski Mts: Maków Podhalański, Jurkuwka hamlet, alt. 500 m, on wood, 20 Sept. 1996, *J. Nowak s.n.* (KRAM-L 43167); Stryszów, Chełm Mt., alt. 600 m, on bark of *Quercus*, 2 June 1996, *J. Nowak s.n.* (KRAM-L 42775); Beskid Niski Mts: valley of Folusz stream, Diabli Kamień monument, on rock, 12 June 1956, *T. Sulma s.n.* (UGDA).

Lepraria incana (L.) Ach.

It is the most common member of the genus in Poland, with a very wide habitat amplitude. The species grows on bark of deciduous and coniferous trees, wood, soil and rocks in open as well as forest habitats (Kukwa 2004a). Analysis of material from all parts of Poland indicated, however, that *L. incana* is much rarer in mountains than in other regions (Czarnota & Kukwa 2001; Kukwa 2004a, b). Altitude seems to be the limiting factor, as it is common below 600 m and relatively rare above this elevation (Kukwa 2004a). Wirth and Heklau (1995) reported a similar trend for the occurrence of this species in Germany.

Lepraria incana is relatively common in the Beskid Sądecki Mts, found most often on bark of *Abies alba*, rarely on bark of deciduous trees, on decaying logs, stumps on wood and rocks (Fig. 6).

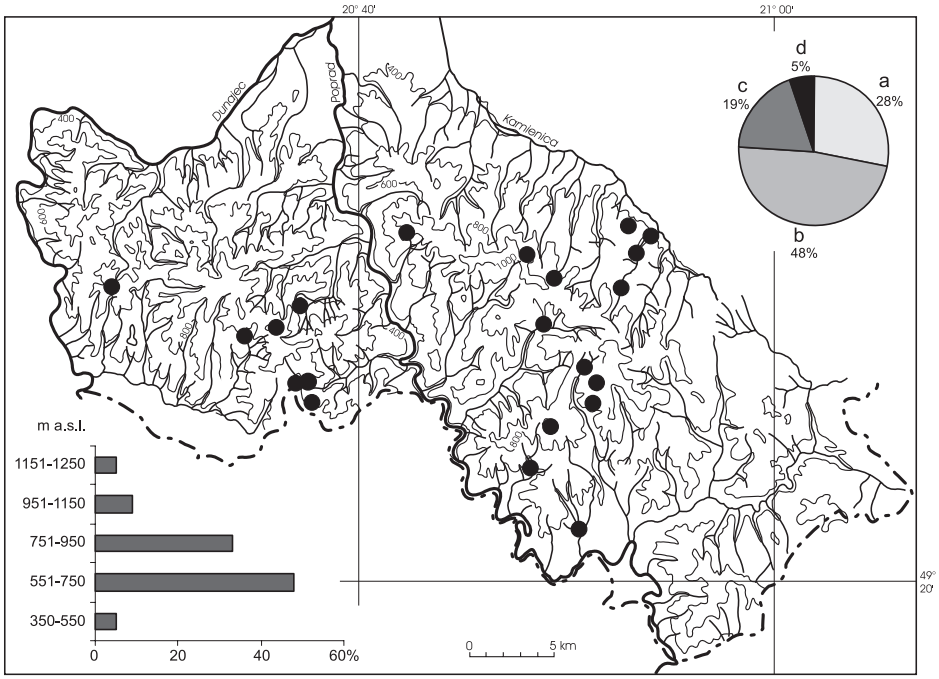

Fig. 6. *Lepraria incana* (L.) Ach. in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks.

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Ciężkowickie foothills, Beskid Śląski Mts, Beskid Żywiecki Mts, Beskid Makowski Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Śląskie foothills (Kukwa 2004a), Pogórze Wiśnickie foothills (Śliwa *et al.* 2001; Kukwa 2004a; Śliwa & Krzewicka 2004), Pogórze Dynowskie foothills (Krzewicka & Śliwa 2000), Kotlina Jasielsko-Krośnieńska basin, Doły Jasielsko-Sanockie depression (Kukwa 2004a), Beskid Śląski Mts (Kukwa 2004a), Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001), Beskid Niski Mts (Kukwa 2004a), Tatry Wysokie Mts (Krzewicka 2004; Kukwa 2004b); the species is also reported from Austria, Hungary, Poland and Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (Kiszka & Kościelniak 2001b, Kukwa 2004a); the species is also reported from Ukraine, Slovakia and Romania (Kondratyuk *et al*. 2003).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: valley of Czercz stream, alt. 700 m, on bark of *Abies alba* (assoc. with *L. elobata* and *L. lobificans*), 21 Feb. 1990; alt. 720 m, on bark of *Fagus sylvatica* (assoc. with *L. rigidula*), 4 Aug. 1990; alt. 750 m, on log (assoc. with *L. elobata*), 4 Aug. 1990; Dzwonkówka Mt., alt. 930 m, on bark of *Fagus sylvatica*, 6 June 1991; upper part of valley of Mała Roztoka stream, alt. 750 m, on bark of *Abies alba*, 23 July 1990; Nad Kotelniczym Potokiem Reserve, alt. 1000 m, on bark of *Abies alba*, 31 Aug. 1990; Radziejowa Mt., alt. 1250 m, on bark of log (assoc. with *L. jackii*), 22 July 1990; Sucha Dolina colony, alt. 840 m, on bark of *Abies alba*, 21 Feb. 1990; JAWORZYNA KRYNICKA RANGE: Cyrla colony, alt. 800 m, on bark of *Fagus sylvatica*, 28 May 1989; Hala Krajnia glade, alt. 1000 m, on overshaded rocks (assoc. with *L. borealis*), 13 June 1991; Hala Szczawnik glade, alt. 930 m, on bark of log (assoc. with *L. lobificans*), 7 Sept. 1989; alt. 980 m, on bark of log, 7 Sept. 1989; valley of Kryściów stream, alt. 570 m, on bark of *Abies alba*, 8 Apr. 1989; alt. 600 m, on bark of *Abies alba*, 8 Apr. 1989; alt. 690 m, on bark of *Abies alba*, 8 Apr. 1989; Łabowiec Reserve, alt. 920 m, on decaying stump (assoc. with *L. elobata* and *L. jackii*),

13 June 1991; Milik, alt. 450 m, on bark of *Tilia cordata*, 5 Aug. 1989; above Nowa Wieś, alt. 640 m, on bark of *Abies alba*, 5 July 1989; valley of Potasznia stream, alt. 640 m, on bark of *Abies alba*, 6 Sept. 1989; Pusta Wielka Mt., alt. 930 m, on overshaded rocks, 5 Aug. 1989; valley of Szczawnik stream, alt. 900 m, on bark of *Abies alba*, 7 Sept. 1989; Żegiestów, alt. 620 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 5 Aug. 1989. Additional record of the species from Żebracze Reserve is published by Czarnota (2002).

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE CIĘŻKOWICKIE FOOTHILLS: Skamieniałe Miasto Reserve, Warownia sandstone tor, on rock, 26 June 2001, *L. Śliwa 1470* (KRAM), on stump, 26 June 2001, *L. Śliwa 1477* (KRAM); Wawóz Wodospad Nature Monument near Ciężkowice, on bark of *Quercus*, 26 June 2001, *L. Śliwa 1498* (KRAM); BESKID ŚLĄSKI MTS: Barania Góra Mt., Dolina Białej Wisełki valley, alt. 850 m, on bark of *Acer pseudoplatanus*, 18 July 1976, *U. Bielczyk s.n.* (KRAM-L 36200); alt. 1100 m, on bark of *Picea abies*, 19 July 1976, *U. Bielczyk s.n.* (KRAM-L 36226); BESKID ŻYWIECKI MTS: Lipowska Mt., alt. 1320 m, on bark of *Picea abies*, 8 Aug. 1973, *U. Bielczyk s.n.* (KRAM-L 41879); BESKID MAKOWSKI MTS: Pcim, Chełm hamlet, alt. 560 m, on bark of *Quercus*, 10 Aug. 1996, *J. Nowak s.n.* (KRAM-L 42906); Tokarnia, Poterbie hamlet, alt. 580 m, on bark of stump, 13 Oct. 1996, *J. Nowak s.n.* (KRAM-L 43472); BESKID NISKI MTS: valley of Folusz stream, on rock, 8 Sept. 1954, *T. Sulma s.n.* (UGDA).

Lepraria jackii Tønsberg

From Poland the species was reported for the first time by Kümmerling *et al*. (1995a), based on a collection from the Śnieżnik massif in the Sudetes. Later it was recorded from many regions of the country (see Kukwa 2003b). *Lepraria jackii* is widespread throughout Poland, and relatively common (Kukwa 2002a). The species grows on tree bark, especially acid and oligotrophic bark, and rarely on wood, soil and noncalcareous rocks. It prefers forests, especially well insolated and rather dry pine and spruce forests (Kukwa 2003a). *Lepraria jackii* was found mainly above 400 m in Baden-Württemberg, Germany (Wirth & Heklau 1995), but only up to 600 m in Norway (Tønsberg 1992). It is difficult to explain that vertical distribution in Germany, but in Norway it seems to be correlated with the absence of available habitats above that altitude. In Poland the species occurs from sea level up to *ca* 1500 m a.s.l. in the Tatra Mts (Kukwa 2003a, 2004b).

Lepraria jackii is a common lichen in the Beskid Sądecki Mts. It grows almost exclusively on tree bark, especially that of coniferous trees. Rarely it has been found on bark of stumps and logs, and very rarely on wood, rocks and soil (Fig. 7).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Wiśnickie foothills, Beskid Śląski Mts, Beskid Żywiecki Mts, Beskid Makowski Mts (see additional specimens examined), Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001), Kotlina Orawsko-Nowotarska basin (Bielczyk & Betleja 2003), Tatry Zachodnie Mts (Kukwa 2004b), Tatry Wysokie Mts (Krzewicka 2004; Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004)

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (see additional specimens examined); the species is also reported from Ukraine (Kondratyuk *et al*. 2003).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: Baniska Reserve, alt. 780 m, on bark of log, 23 July 1990; Będzikówka area (north of Skałka Szczawnicka Mt.), alt. 790 m, on bark of log, 6 Aug. 1990; valley of Czercz stream, alt. 610 m, on bark of *Picea abies*, 3 May 1990; alt. 640 m, on bark of *Abies alba*, 3 May 1990; alt. 770 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 4 Aug. 1990; Czeremcha area (south west of Przehyba pass), alt. 1140 m, on bark of *Picea abies*, 11 Aug. 1990; valley of Kotelniczy stream, alt. 800 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. elobata*), 31 Aug. 1990; valley of Mała Roztoka stream, alt. 460 m, on bark of *Populus*, 5 May 1990; valley of Potasznia stream, alt. 620 m, on bark of *Abies alba* (assoc. with *L. elobata*), 6 Sept. 1989; valley of Potok Biały stream, alt. 680 m, on bark of *Abies alba*, 6 June 1991; valley of Potok Młodowski stream, alt. 420 m, on bark of *Pinus sylvestris*, 20 July 1990; alt. 560 m, on bark of log, 20 July 1990; alt. 650 m, on bark of *Abies alba*, 20 July 1990; alt. 740 m, on bark of *Abies alba*, 4 May 1990; Niemcowa colony, alt. 870 m, on bark of *Abies alba* (assoc. with *L. elobata*), 4 May 1990; valley of Potok Przysietnicki stream, alt. 570 m, on bark of *Abies alba*, 1 May 1991; Przehyba pass, alt. 1060 m,

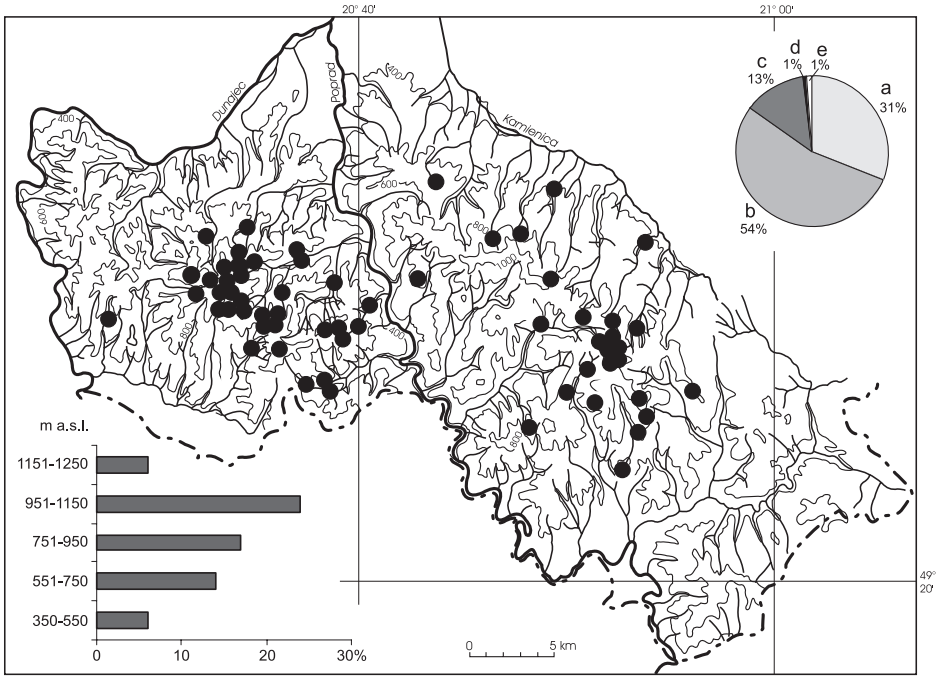

Fig. 7. *Lepraria jackii* Tønsberg in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks, e – soil.

on bark of *Picea abies*, 11 Aug. 1990; alt. 1070 m, on wood, 11 Aug. 1990; alt. 1170 m, on bark of *Picea abies*, 22 July 1990, near tourist hostel, alt. 1170 m, on bark of *Picea abies* (assoc. with *L. elobata*), 6 Aug. 1990; peak of 1192 m a. s. l. near Przehyba pass, alt. 1110 m, on bark of *Picea abies*, 10 Aug. 1990; alt. 1110 m, on bark of *Sorbus aucuparia*, 21 July 1990; alt. 1120 m, on bark of *Picea abies*, 21 July 1990; alt. 1140 m, on bark of *Picea abies* (assoc. with *L. elobata*), 22 July 1990; Radziejowa Mt., alt. 1240 m, on bark of *Picea abies*, 22 July 1990; alt. 1250 m, on bark of log (assoc. with *L. incana*), 22 July 1990; north slope of Radziejowa Mt., alt. 1100 m, on bark of *Picea abies*, 23 July 1990; Skałka Szczawnicka Mt., alt. 1100 m, on bark of log (assoc. with *L. elobata*), 6 Aug. 1990; valley of Stary stream, alt. 930 m, on bark of stump, 2 May 1991; alt. 1070 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 2 May 1991; valley of Wielka Roztoka stream, alt. 470 m, on bark of *Abies alba* (assoc. with *L. elobata*), 21 July 1990; alt. 480 m, on bark of *Fagus sylvatica*, 21 July 1990; Wielki Rogacz Mt., alt. 1020 m, on bark of *Picea abies* (assoc. with *L. elobata*), 21 Feb. 1990; alt. 1150 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 22 July 1990; Wietrzne Dziury Mt., alt. 1060 m, on bark of *Picea abies*, 21 July 1990; Zgrzypy Mt., alt. 970 m, on bark of log (assoc. with *L. eburnea* and *L.elobata*), 1 May 1991; Złomisty Wierch Mt., alt. 1100 m, on bark of *Picea abies*, 31 Aug. 1990; alt. 1200 m, on bark of *Fraxinus excelsior* (assoc. with *L. elobata*), 22 July 1990; JAWORZYNA KRYNICKA RANGE: valley of Czaczowiec stream, alt. 830 m, on bark of *Fagus sylvatica*, 10 Aug. 1989; Góra Skała Mt. above Kokuszka stream, alt. 730 m, on bark of *Betula*, 4 July 1989; Góra Skała Mt. near Kokuszka, alt. 770 m, on sunny side of rocks (assoc. with *L. eburnea*), 16 June 1990; south slope of Jaworzyna Mt., alt. 970 m, on bark of *Picea abies* (assoc. with *L. elobata*), 26 May 1989; Jaworzyna Mt., alt. 1000 m, on bark of *Betula*, 26 May 1989; Juchówka area in upper most part of Potasznia stream, alt. 940 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 3 June 1989; valley of Kryściów stream, alt. 550 m, on bark of *Abies alba*, 8 Apr. 1989; Łabowiec Reserve, alt. 920 m, on decaying wood of stump (assoc. with *L. elobata* and *L. incana*), 13 June 1991; Ostra Mt., alt. 710 m, on bark of *Abies alba*, 9 Aug. 1989; valley of Potasznia stream, alt. 620 m, on bark of *Abies alba* (assoc. with *L. elobata*), 6 Sept. 1989; valley of Potok Feleczyn stream, alt. 580 m, on bark of *Fagus sylvatica*, 7 Aug. 1989; valley of Potok Łosiański stream, alt. 740 m, on bark of log, 14 June

1991; valley of Potok Składziszczański stream, alt. 790 m, on bark of *Pinus sylvestris* (assoc. with *L. elobata*), 11 Aug. 1989; alt. 850 m, on bark of *Abies alba*, 10 Aug. 1989; Przełęcz Krzyżowa pass, alt. 800 m, on bark of *Abies alba*, 11 July 1989; between Pusta Wielka Mt. and Wierch Zubrzyk Mt., alt. 890 m, on bark of *Picea abies*, 7 July 1989; Runek Mt., alt. 970 m, on bark of *Fagus sylvatica*, 8 Sept. 1989; alt. 990 m, on bark of *Abies alba*, 8 Sept. 1989; alt. 1000 m, on bark of *Picea abies* (assoc. with *L. elobata*), 27 May 1989; alt. 1020 m, on bark of *Salix*, 8 Sept. 1989; alt. 1080 m, on bark of *Picea abies*, 8 Sept. 1989; alt. 1080 m, on bark of *Picea abies*, 26 May 1989; alt. 1080 m, on bark of *Sorbus aucuparia* (assoc. with *L. elobata*), 26 May 1989; between Runk Mt. and Kryściów stream, alt. 900 m, on bark of *Betula* (assoc. with *L. rigidula*), 9 Apr. 1989; valley of Szczawniczek stream, alt. 600 m, on soil, 5 Sept. 1989; alt. 700 m, on bark of *Picea abies*, 11 July 1989; well-head of Szczawnik stream, alt. 920 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. elobata*), 7 Sept. 1989; Wyżne Młaki pass (north of Parchowatka Mt.), alt. 870, on bark of *Pinus sylvestris*, 4 June 1989. Additional record of the species from Żebracze Reserve is published by Czarnota (2002).

Additional specimens examined. West Carpathians. Pogórze Wiśnickie foothills: Bukowiec Reserve near Tymowa, on stump, 22 Sept. 1999, *B. Krzewicka 1231* (KRAM); forest S of Sobolów, on bryophytes growing on soil, 5 June 2000, *L. Śliwa 1169* (KRAM); Beskid Śląski Mts: Barania Góra Mt., Dolina Białej Wisełki valley, alt. 1150 m, on bark of *Picea abies*, 23 Sept. 1975, *U. Bielczyk s.n.* (KRAM-L 36257); Beskid Żywiecki Mts: Pilsko range, Pilsko Reserve, alt. 1160 m, 28 Sept. 2003, *L. Śliwa 2087* (KRAM); Polica range, Mosorny Groń Mt., alt. 1040 m, on bark of *Picea abies*, 14 June 1965, *J. Nowak s.n.* (KRAM-L 15095); Rysianka Mt., alt. 1000 m, on bark of *Fagus sylvatica*, 3 Sept. 1975, *U. Bielczyk s.n.* (KRAM-L 43985); Szczawina Mt., alt. 1330 m, on bark of *Picea abies*, 9 Aug. 1973, *U. Bielczyk s.n.* (KRAM-L 41880); Beskid Makowski Mts: Łętownia, Klimaszowa hamlet, alt. 520 m, on bark of *Abies alba*, 11 Oct. 1996, *J. Nowak s.n.* (KRAM-L 43284); Wieprzczanka, Adamówka Mt., alt. 700 m, on bark of *Quercus*, 18 June 1996, *J. Nowak s.n.* (KRAM-L 42762); Żarnówka, Piekarzówka hamlet, alt. 550 m, on soil, 5 Sept. 1996, *J. Nowak s.n.* (KRAM-L 43104), above Przysłop hamlet, alt. 680 m, on bark of *Abies alba*, 20 Sept. 1996, *J. Nowak s.n.* (KRAM-L 43118). – East Carpathians. Bieszczady Zachodnie Mts: Sianki, on *Acer pseudoplatanus* and *Picea abies*, 19 June 2002, *P. Czarnota s.n.* (UGDA); Smerek, forest by the road between Smerek and Wetlina villages, on stump, 17 Sept. 1999, *B. Krzewicka 1223* (KRAM).

Lepraria lobificans Nyl.

The first report of *L. lobificans* in Poland was by Kümmerling *et al*. (1993), based on specimens collected in central part of the country. Later it was noted by many authors and from various regions (see Kukwa 2003b). It is a common species, growing mainly on meso- to eutrophic, medium acidic to basic substrates. It occurs commonly on tree bark, but also very often on rocks and saxicolous mosses. Rarely the taxon is noted on wood and soil. *Lepraria lobificans* is a higrophilous lichen growing usually in shade. As an epiphyte it prefers forest conditions, but also occurs in open areas, mostly near lakes or rivers. Very rarely the species occupies roadside trees (Kukwa 2003a, b).

In the Beskid Sądecki Mts *L. lobificans* is a common lichen, growing mainly on bark of deciduous trees and on rocks, very rarely on bark of coniferous trees, on bark of logs, and on mosses and soil (Fig. 8).

Distribution in the West Carpathians. Pogórze Ciężkowickie foothills, Beskid Śląski Mts, Beskid Mały Mts, Beskid Żywiecki Mts, Beskid Makowski Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Śląskie foothills (see Bielczyk 2003), Pogórze Wiśnickie foothills (Śliwa *et al.* 2001; Śliwa & Krzewicka 2004), Pogórze Dynowskie foothills (Krzewicka & Śliwa 2000), Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001), Tatry Zachodnie Mts (Bielczyk 1999; Kukwa 2004b), Tatry Wysokie Mts (Krzewicka 2004; Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

Distribution in the East Carpathians. Bieszczady Zachodnie Mts (Kiszka & Kościelniak 2001a), Góry Sanocko-Turczańskie Mts (Kościelniak 2004); the species is also reported from Ukraine (Kondratyuk *et al.* 2003).

Specimens examined. West Carpathians. Beskid Sądecki Mts, Radziejowa Range: valley of

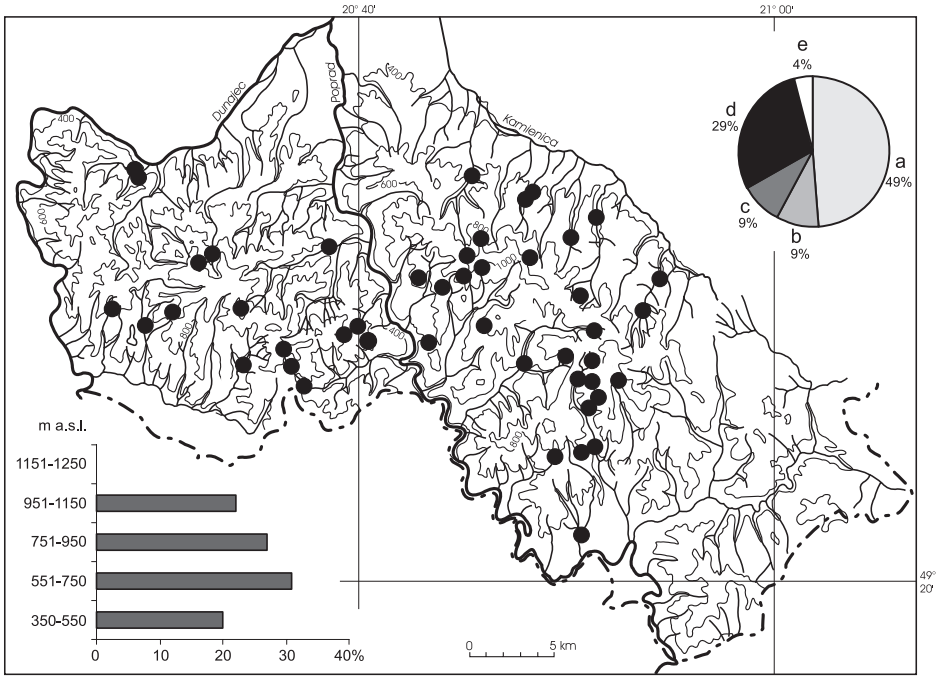

Fig. 8. *Lepraria lobificans* Nyl. in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks, e – soil.

Brzynka stream, alt. 380 m, on bark of *Salix*, 16 May 1991; alt. 400 m, on mosses, 16 May 1991; Bziniaki colony, alt. 600 m, on soil, 4 May 1990; valley of Czarna Woda stream, alt. 700 m, on soil (assoc. with *L. elobata*), 31 Aug. 1990; valley of Czercz stream, alt. 700 m, on bark of *Abies alba* (assoc. with *L. elobata* and *L. incana*), 21 Feb. 1990; alt. 850 m, on bark of *Fagus sylvatica* (assoc. with *L. eburnea* and *L. elobata*), 4 Aug. 1990; valley of Jaworzynka stream, alt. 780 m, on overshaded, mossy rocks, 4 May 1991; Kamień Św. Kingi monument, alt. 1020 m, on mosses, 6 Aug. 1990; valley of Potok Biały stream, alt. 630 m, on overshaded rocks, 6 June 1991; valley of Potok Młodowski stream, alt. 570 m, on bark of *Fagus sylvatica*, 20 July 1990; alt. 640 m, on bark of *Abies alba* (assoc. with *L. eburnea*), 20 July 1990; Roztoka Ryterska, alt. 450 m, on rocks, 5 May 1990; Sewerynówka area in valley of Sopotnicki stream, alt. 600 m, on rocks, 3 May 1991; Skalskie in valley of Pod Górami stream, alt. 1050 m, on bark of *Fagus sylvatica*, 12 Aug. 1990; Wielki Rogacz Mt., alt. 1050 m, on bark of *Fagus sylvatica*, 4 Aug. 1990; Złomisty Wierch Mt., alt. 1100 m, on bark of *Picea abies* (assoc. with *L. rigidula*), 31 Aug. 1990; JAWORZYNA KRYNICKA RANGE: Czerteź area (SE of Pisana Hala glade), alt. 900 m, on bark of *Fagus sylvatica* (assoc. with *L. vouauxii*), 17 Aug. 1989; Góra Sokołowska Mt., alt. 960 m, on rock, 17 Aug. 1989; Góra Skała Mt. above Kokuszka, alt. 700 m, on overshaded rocks (assoc. with *L. crassissima*), 16 June 1990; Hala Krajnia glade, alt. 980 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 10 Aug. 1989; Hala Szczawnik glade, alt. 930 m, on bark of log (assoc. with *L. incana*), 7 Sept. 1989; Homerka stream, alt. 500 m, on bark of *Salix* (assoc. with *L. elobata*), 16 Aug. 1989; between Jaworzyna Mt. and Runek Mt., alt. 1050 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 26 May 1989; near Jarzębaki colony, alt. 670 m, on soil (assoc. with *L. eburnea*), 4 Aug. 1989; valley of Łabowszczański Potok stream, alt. 630 m, on overshaded and mossy rocks, 12 July 1989; trail from Łomnica to Parchowatka Mt., alt. 800 m, on bark of *Juniperus* (assoc. with *L. elobata*), 10 July 1989; valley of Łosiański Potok stream, alt. 680 m, on bark of *Fagus sylvatica* (assoc. with *L. vouauxii* and *L. elobata*), 9 Apr. 1989; Łosie, alt. 620 m, on bark of *Salix*, 9 Apr. 1989; Milik, alt. 480 m, on rocks (assoc. with *L. vouauxii*), 5 Aug. 1989; valley of Milik stream, alt. 800 m, on bark of *Fagus sylvatica*, 5 Aug. 1989; near Nad Wierchomlą tourist hostel, alt. 850 m, on overshaded rocks (assoc. with *L. elobata*), 4 June 1989; above Palenica colony, alt. 810 m, on bark of

Fagus sylvatica (assoc. with *L. elobata*), 7 July 1989; Piwniczna, Zawodzie colony, alt. 380 m, on bark of *Carpinus*, 30 Apr. 1989; valley of Potasznia stream, alt. 800 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 6 Sept. 1989; valley of Potok Uhryński stream, alt. 590 m, on bark of *Salix*, 8 Aug. 1989; alt. 850 m, on bark of *Fagus sylvatica*, 8 Aug. 1989; Sarnica area (south of Pisana Hala glade), alt. 970 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 4 Aug. 1989; Składziste, alt. 510 m, on mossy rocks, 11 Aug. 1989; alt. 540 m, on bark of *Salix* (assoc. with *L. vouauxii*), 11 Aug. 1989; valley of Szczawnik stream, alt. 630 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 3 Aug. 1989; alt. 830 m, on bark of *Fagus sylvatica* (assoc. with *L. vouauxii*), 3 Aug. 1989; well-head of Szczawnik stream, alt. 950 m, on bark of stump, 7 Sept. 1989; junction of Wierchomlanka stream, alt. 530 m, on bark of *Salix* (assoc. with *L. vouauxii*), 6 July 1989; valley of Złotniczańska Rzeka stream, alt. 960 m, on bark of log, 16 Aug. 1989; Żebracze area near Hala Szczawnik glade, alt. 980 m, on stones, 7 Sept. 1989. Additional records of the species are published by Czarnota (2002) from Żebracze Reserve.

Additional specimens examined. West Carpathians. Pogórze Ciężkowickie foothills: Skamieniałe Miasto Reserve, Warownia sanstone tor, on rock, 26 June 2001, *L. Śliwa 1467* (KRAM); Beskid Śląski Mts: Barania Góra Mt., Przysłop shelter-home, alt. 1000 m, on bark of *Fagus sylvatica*, 18 July 1976, *U. Bielczyk s.n.* (KRAM-L 36173); Beskid Mały Mts: Ostałowa, alt. 290 m, on bark of *Salix,* 12 July 1995, *J. Nowak s.n.* (KRAM-L 41873); Wielka Puszcza, alt. 500 m, on soil, 4 Oct. 1962, *J. Nowak s.n.* (KRAM-L 10037); Zagórze near Mucharz, alt. 300 m, on wood, 10 June 1995, *J. Nowak s.n.* (KRAM-L 41826); Zwalisko Mt., alt. 800 m, on bark of *Fagus sylvatica,* 3 Oct. 1962, *J. Nowak s.n.* (KRAM-L 10018); Beskid Żywiecki Mts: Mała Babia Góra Mt., alt. 950 m, on bark of *Fagus sylvatica*, 26 Aug. 1976, *U. Bielczyk s.n.* (KRAM-L 43886); alt. 1050 m, on bark of *Fagus sylvatica*, 28 Aug. 1976, *U. Bielczyk s.n.* (KRAM-L 43903); Pilsko range, N slope of Wolentarski Groń Mts., 29 Sept. 1964, *J. Nowak s.n.* (KRAM-L 16330); Rysianka Mt., alt. 1050 m, on bark of *Fagus sylvatica*, 3 Sept. 1975, *U. Bielczyk s.n.* (KRAM-L 43986); Beskid Makowski Mts: Pcim, Krawcy hamlet, alt. 340 m, by Suszanka stream, on bark of *Salix* 20 Aug. 1996, *J. Nowak s.n.* (KRAM-L 42928), Mizerówka hamlet, by Krzywiczanka stream, alt. 340 m, on bark of *Fraxinus excelsior*, 22 Aug. 1996, *J. Nowak s.n.* (KRAM-L 42970), Swaczowa hamlet, by Mała Suszanka stream, alt. 390 m, on bark of *Alnus glutinosa*, 24 Aug. 1996, *J. Nowak s.n.* (KRAM-L 43019), Szarkówka hamlet, alt. 340 m, on soil, 23 June 1996, *J. Nowak s.n.* (KRAM-L 42824); Beskid Niski Mts: valley of Folusz stream, Diabli Kamień monument, on bark of tree, no date, *T. Sulma s.n.* (UGDA); Szymbark village near Gorlice, on concrete, 22 Apr. 2001, *W. Fałtynowicz s.n.* (UGDA).

Lepraria membranacea (Dicks.) Vain.

It is a relatively rare mountain lichen in Poland. In the past it was reported as common all over the country, but the revision of herbarium material showed that all lowland and many mountain specimens represent other species. In most cases they belonged to *L. lobificans* or *L. vouauxii*, and rarely to other species of the genus (Kukwa 2001, 2002b, 2003a, b).

Śliwa (1998) reported *L. membranacea* in the Beskid Sądecki Mts as *Leproloma membranaceum* (Dicks.) Vain. Here the identification is confirmed by TLC.

The species is very rare and probably endangered in the studied area. It was found on andesite rocks (Fig. 3).

Distribution in the West Carpathians. Pogórze Ciężkowickie foothills, Beskid Niski Mts (see additional specimens examined), Pogórze Wiśnickie foothills (Śliwa *et al.* 2001), Pogórze Dynowskie foothills (Krzewicka & Śliwa 2000), Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001), Tatry Wysokie Mts (Krzewicka 2004, Kukwa 2004b); the species is also reported from the Czech Republic, Hungary and Slovakia (Bielczyk *et al.* 2004).

Distribution in the East Carpathians. The species is also reported from Ukraine (Kukwa 2000; Kondratyuk *et al*. 2003), Slovakia and Romania (Kondratyuk *et al*. 2003).

Specimens examined. West Carpathians. Beskid Sądecki Mts, Radziejowa Range: Bryjarka hill, alt. 650 m, on andesite rocks, 6 June 1991.

Additional specimens examined. West Carpathians. Pogórze Ciężkowickie foothills: Skamieniałe Miasto Reserve, Czarownica sandstone tor, on rock, 26 June 2001, *L. Śliwa 1455* (KRAM); Beskid Niski Mts: valley of Folusz stream, Diabli Kamień monument, on humus, 8 Sept. 1954, *T. Sulma s.n.* (UGDA).

Lepraria neglecta (Nyl.) Erichsen

This species has been reported from many areas of Poland. However, the revision of available materials showed it was mostly misidentified. At present *L. neglecta* is known mainly from mountain regions up to 1600 m a.s.l., but with scattered localities in northern regions of the Polish lowlands. The species prefers noncalcareous rocky substrate, but is found rarely on mosses, soil and bark of trees (Kukwa 2003a, b, 2004b).

In the Beskid Sądecki Mts, *L. neglecta* is confirmed from one locality, where two specimens were collected. The species was reported from that site by Śliwa (1998), and the identification of the specimens was confirmed by TLC.

The species seems to be rare in the area, and probably endangered. It occupies terricolous mosses and sandstone (Fig. 2).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Ciężkowickie foothills, Beskid Żywiecki Mts, Beskid Makowski Mts, Gorce Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Wiśnickie foothills (Śliwa *et al.* 2001), Pogórze Dynowskie foothills (Krzewicka & Śliwa 2000), Tatry Wysokie Mts (Krzewicka 2004, Kukwa 2004b); the species is also reported from the Czech Republic, Hungary and Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (see additional specimens examined); the species is also reported from Slovakia and Romania (Kondratyuk *et al*. 2003).

SPECIMEN EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, JAWORZYNA KRYNICKA RANGE: glade above valley of Łomnicka stream, alt. 870 m, on terricolous mosses and sandstone, 4 Aug. 1989.

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE CIĘŻKOWICKIE FOOTHILLS: Skamieniałe Miasto Reserve, Ratusz sandstone tor, on rock, 26 June 2001, *L. Śliwa 1436* (KRAM); BESKID ŻYWIECKI MTS: Babia Góra massif, Diablak Mt., 0.3 km E of the peak, alt. 1700 m, on saxicolous mosses, 18 Aug. 1965, *J. Nowak s.n.* (KRAM-L 2955); below Kościółki rocks, alt. 1500 m, on saxicolous mosses, 5 Sept. 1967, *J. Nowak s.n.* (KRAM-L 1270); Rycerska Dolina valley, 8 km EES of Zwardoń, 9 km S of Milówka, alt. 560 m, on sandstone, 24 Sept. 1986, *J. Nowak s.n.* (KRAM-L 30359) [see Nowak 1998]; BESKID MAKOWSKI MTS: Pasmo Pewelskie range, valley of Buławczański Potok stream, alt. 550 m, on sandstone, 17 Sept. 1965, *J. Nowak s.n.* (KRAM-L 13465) [see Nowak 1968]; Pcim, valley of Kaczanka stream, near U Fudalego hamlet, alt. 450 m, on sandstone, 5 July 1966, *J. Nowak s.n.* (KRAM-L 42807); Poręba, Śliwnik Mt., alt. 610 m, on saxicolous mosses, 12 Apr. 1966, *J. Nowak s.n.* (KRAM-L 5642); GORCE MTS: S slope of Kiczora Mt., alt. 1260 m, on saxicolous mosses, 1 Apr. 1959, *K. Glanc s.n.* (KRAM-L 38853); BESKID NISKI MTS: valley of Folusz stream, Diabli Kamień monument, on rock, Sept. 1954, *T. Sulma s.n.* (UGDA)). – EAST CARPATHIANS. BIESZCZADY ZACHODNIE MTS: by the road to Halicz Mt., on soil, 23 Aug. 1998, *P. Górski s.n.* (UGDA); Tarnica Mt., alt. 1330 m, on sandstone, 25 Aug. 1957, *K. Glanc* (KRAM-L 38850); alt. 1340 m, on saxicolous mosses, 25 Aug. 1957, *K. Glanc s.n.* (KRAM-L 38849) [see Glanc & Tobolewski 1960].

Lepraria rigidula (de Lesd.) Tønsberg

The species was reported from Poland for the first time by Kümmerling *et al.* (1995b) from Ślęża Mt. in Silesia. *Lepraria rigidula* is a relatively frequent lichen in Poland, but not as common and abundant as *L. incana* or *L. lobificans* (Kukwa 2003a, b). Its vertical distribution reaches 1500 m a.s.l. The species prefers open situations, but has also been found many times in forests, in which case the thalli were usually much smaller. It occupies most often well insolated, meso- to eutrophic and medium acidic to neutral bark of deciduous trees, and rarely other types of phorophytes. It occurs also on noncalcareous rocks, soil and wood. Very rarely the thalli of *L. rigidula* grow partly on other lichens (Kukwa 2003a).

Lepraria rigidula is relatively common in the Beskid Sądecki Mts, growing on bark of deciduous trees and very rarely in other habitats. Occasionally it was found on bark of *Abies alba*, on rocks, and on terricolous or saxicolous mosses (Fig. 9).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Dynowskie foothills, Beskid Żywiecki Mts, Beskid Makowski Mts, Beskid Niski Mts (see additional specimens examined), Pogórze Śląskie foothills (see Bielczyk 2003), Gorce Mts (Czarnota

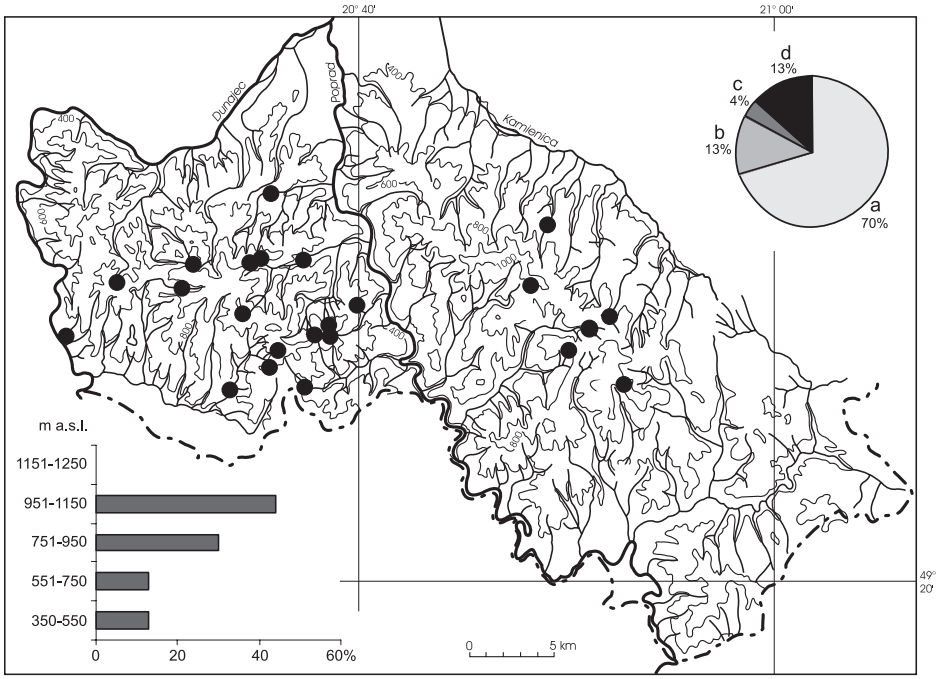

Fig. 9. *Lepraria rigidula* (de Lesd.) Tønsberg in the Beskid Sądecki Mts; a – bark of deciduous trees, b – bark of coniferous trees, c – stumps, logs, wood, d – rocks.

& Kukwa 2001), Tatry Zachodnie, Tatry Wysokie Mts (Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (Kiszka & Kościelniak 2001a); the species is also reported from Ukraine (Kondratyuk *et al*. 2003).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: valley of Czercz stream, alt. 720 m, on bark of *Fagus sylvatica* (assoc. with *L. incana*), 4 Aug. 1990; Dzwonkówka Mt., alt. 950 m, on bark of *Fagus sylvatica*, 12 Aug. 1990; valley of Jaworki stream, alt. 610 m, on bark of *Acer*, 31 Aug. 1990; Kamień Św. Kingi monument, alt. 1000 m, on rocks (assoc. with *L. eburnea*), 31 Aug. 1990; Kordowiec Mt., alt. 760 m, on bark of *Fraxinus excelsior*, 4 May 1990; Krościenko, alt. 480 m, on bark of *Salix*, 12 Aug. 1990; Niemcowa colony, alt. 920 m, on bark of *Abies alba*, 4 May 1990; alt. 970 m, on bark of *Cerasus*, 4 May 1990; peak of 1026 m a.s.l, above Niemcowa colony, 1020 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 22 July 1990; Przysietnica, alt. 490 m, on bark of *Cerasus*, 1 May 1991; between Ruski Wierch Mt. and Wielki Rogacz Mt., alt. 940 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 3 May 1990; valley of Sopotnicki stream, alt. 1000 m, on bark of *Fagus sylvatica*, 3 May 1991; valley of Wielka Roztoka stream, alt. 490 m, on bark of *Fraxinus excelsior* (assoc. with *L. elobata*), 21 July 1990; Wielki Rogacz Mt., alt. 1090 m, on bark of *Fagus sylvatica*, 04 Aug. 1990; Wietrzne Dziury Mt., alt. 960 m, on bark of *Acer* (assoc. with *L. elobata*), 21 July 1990; alt. 1000 m, on saxicolous mosses, 21 July 1990; Złomisty Wierch Mt., alt. 1100 m, on bark of *Picea abies* (assoc. with *L. lobificans*), 31 Aug. 1990; JAWORZYNA KRYNICKA RANGE: between Jaworzyna Mt. and Runek Mt., alt. 1020 m, on bark of *Fagus sylvatica*, 26 May 1989; Łabowska Hala glade, alt. 1050 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata*), 27 May 1989; near Nad Wierchomlą tourist hostel, alt. 800 m, on terricolous mosses, 4 Sept. 1989; valley of Potasznia stream, alt. 880 m, on bark of log (assoc. with *L. elobata*), 3 June 1989; valley of Potok Feleczyn stream, alt. 640 m, on bark of *Malus domestica*, 7 Aug. 1989; between Runek Mt. and Kryściów stream, alt. 900 m, on bark of *Betula* (assoc. with *L. jackii*), 9 Apr. 1989.

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE DYNOWSKIE FOOTHILLS: Prządki

Reserve, alt. 460–520 m, on bark of *Betula*, 24 May 1999, *L. Śliwa & B. Krzewicka s.n.* (KRAM-L 49676); BESKID ŻYWIECKI MTS: Babia Góra massif, Babiogórski National Park, Zawoja Markowa shelter-home, on bark of *Acer platanoides*, 25 July 2002, *M. Kukwa 1688* (UGDA); Hala Boracza glade, alt. 500 m, on bark of *Fagus sylvatica*, 24 May 1974, *U. Bielczyk s.n.* (KRAM-L 41878); BESKID MAKOWSKI MTS: Pcim, Nychy hamlet, alt. 400 m, on bark of *Fraxinus excelsior*, 20 Aug. 1996, *J. Nowak s.n.* (KRAM-L 42931), Sucha hamlet, alt. 500 m, on bark of *Salix*, 20 Aug. 1996, *J. Nowak s.n.* (KRAM-L 42947); Skomielna Czarna, U Jendrocha hamlet, alt. 470 m, on bark of *Fraxinus excelsior*, 4 Oct. 1966, *J. Nowak s.n.* (KRAM-L 43266); BESKID NISKI MTS: valley of Folusz stream, Diabli Kamień monument, on bark of *Abies alba*, 8 Sept. 1954, *T. Sulma s.n.* (UGDA).

Lepraria vouauxii (Hue) R. C. Harris

The species was reported for the first time from Poland as *Leproloma vouauxii* (Hue) J. R. Laundon by Laundon (1989) from the northern part of the country (former Słupsk and Gdańsk provinces). The frequency and habitat requirements of this species in Poland are similar to those of *L. rigidula* (Kukwa 2003b), but *L. vouauxii* grows more frequently on rocks and prefers those containing calcium carbonate. The species is reported from elevations up to 1570 m but is less frequent above 1000 m (Kukwa 2003a). A similar vertical distribution of *L. vouauxii* was reported in Norway by Tønsberg (1992) and in Germany by Wirth and Heklau (1995). In the British Isles the species prefers lowland localities (Laundon 1989), whereas in Sardinia it seems to be a mountain species with a vertical range of 780–1000 m a.s.l. (Zedda 2000). In Sardinia, *L. vouauxii* is considered to be a characteristic species of old oak woods (Zedda 2000). In Poland, however, the species is known mostly from open situations (Kukwa 2003).

In the Beskid Sądecki Mts, *L. vouauxii* was found mainly on bark of deciduous trees, but also on rocks. It prefers open sites and occurs mostly at lower elevations (Fig. 10).

DISTRIBUTION IN THE WEST CARPATHIANS. Pogórze Wiśnickie foothill, Beskid Mały Mts, Beskid Makowski Mts, Beskid Wyspowy Mts (see additional specimens examined), Pogórze Śląskie foothills (see Bielczyk 2003), Gorce Mts (Czarnota 2000; Czarnota & Kukwa 2001), Tatry Zachodnie Mts (Alstrup & Olech 1990; Kukwa 2004b); the species is also reported from Slovakia (Bielczyk *et al.* 2004).

DISTRIBUTION IN THE EAST CARPATHIANS. Bieszczady Zachodnie Mts (see additional specimens examined); the species is also reported from Ukraine (Kukwa 2000; Kondratyuk *et al*. 2003).

SPECIMENS EXAMINED. WEST CARPATHIANS. BESKID SĄDECKI MTS, RADZIEJOWA RANGE: Baćkowskie colony in valley of Mała Roztoka stream, alt. 900 m, on bark of *Acer*, 23 July 1990; Czercz, alt. 400 m, on rocks, 27 Aug. 1990; upper part of valley of Mała Roztoka stream, alt. 720 m, on overshaded rocks, 10 Aug. 1990; Moszczenica, alt. 410 m, on bark of *Salix*, 18 May 1991; Praczka colony, alt. 490 m, on bark of *Pyrus*, 4 May 1991; Przysietnica, alt. 450 m, on bark of *Fraxinus excelsior*, 1 May 1991; Roztoka Ryterska, alt. 400 m, on bark of *Salix*, 5 May 1990; JAWORZYNA KRYNICKA RANGE: Czerteż area (south east of Pisana Hala glade), alt. 900 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 17 Aug. 1989; Łabowiec Reserve, alt. 930 m, on bark of *Fagus sylvatica*, 13 June 1991; valley of Łosiański Potok stream, alt. 590 m, on bark of *Fraxinus excelsior*, 9 Apr. 1989; alt. 680 m, on bark of *Fagus sylvatica* (assoc. with *L. elobata* and *L. lobificans*), 9 Apr. 1989; Łosie, alt. 620 m, on bark of *Salix*, 9 Apr. 1989; valley of Milik stream, alt. 420 m, on bark of *Salix*, 15 July 1989; Milik, alt. 480 m, on rocks (assoc. with *L. lobificans*), 5 Aug. 1989; valley of Potasznia stream, alt. 680 m, on stone, 6 July 1989; Składziste, alt. 530–540 m, on bark of *Salix* (assoc. with *L. lobificans*), 11 Aug. 1989; valley of Szczawnik stream, alt. 830 m, on bark of *Fagus sylvatica* (assoc. with *L. lobificans*), 3 Aug. 1989; junction of Wierchomlanka stream, alt. 530 m, on bark of *Salix* (assoc. with *L. lobificans*), 6 July 1989; Żegiestów, alt. 480 m, on bark of *Fraxinus excelsior*, 5 Aug. 1989.

ADDITIONAL SPECIMENS EXAMINED. WEST CARPATHIANS. POGÓRZE WIŚNICKIE FOOTHILLS: Chrostowa, trees along the road side and by the houses, on bark of *Salix*, 17 June 1998, *L. Śliwa 887* (KRAM); on bark of *Malus domestica*, 17 June 1998, *L. Śliwa 893* (KRAM); Cichawka, S slope of the hill along the road, on bark of *Salix*, 8 May 1998, *L. Śliwa 546* (KRAM); forest at well-head of Cichawka stream, on bark of *Pirus*, 19 May 1998, *L. Śliwa 632* (KRAM); Łapanów, at

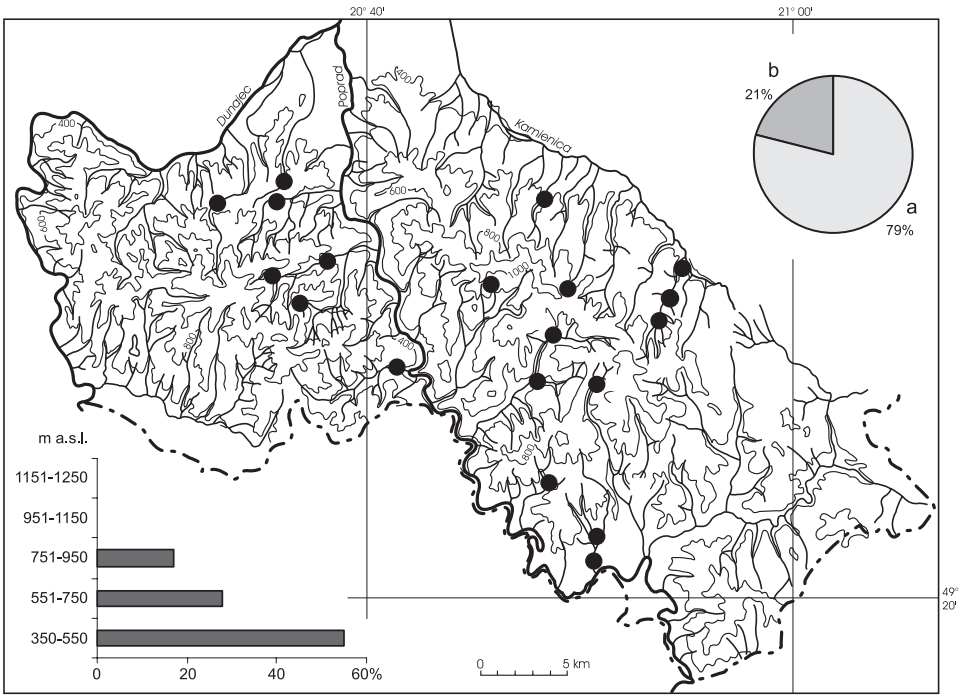

Fig. 10. *Lepraria vouauxii* (Hue) R. C. Harris in the Beskid Sądecki Mts; a – bark of deciduous trees, b – rocks.

the road to Muchówka, trees alonge the road side, on bark of *Populus*, 3 June 1998, *L. Śliwa 764* (KRAM); Łapanów-Rogatka, trees along the stream and on the road side, on bark of *Salix*, 3 June 1998, *L. Śliwa 836* (KRAM); BESKID MAŁY MTS: Porębka, alt. 330 m, at the base of Koszebnika Mt., on sandstone, 7 Aug. 1960, *J. Nowak s.n.* (KRAM-L 6233); between Skawce and Mucharz villages, by Skawa River, alt. 300 m, on bark of *Salix*, 10 July 1995, *J. Nowak s.n.* (KRAM-L 41828); BESKID MAKOWSKI Mts: Pcim, by Kaczanka strem, alt. 400 m, on bark of *Fraxinus excelsior*, 17 June 1971, *K. Waydowska s.n.* (KRAM-L 34476); BESKID WYSPOWY MTS: Kasinka Mała, alt. 420 m, by the stream, on bark of *Salix*, 14 Sept. 1995, *J. Nowak s.n.* (KRAM-L 42532). – EAST CARPATHIANS. BIESZCZADY ZACHODNIE MTS: Cisna, on saxicolous mosses, 12 Aug. 2001, *M. Kukwa 1068* (UGDA); former Jaworzec, on bark of *Salix*, 13 Aug. 2001, *M. Kukwa 1080* (UGDA); Łopienka valley, former Łopienka, on bark of *Tilia cordata*, 14 Aug. 2001, *M. Kukwa 1096* (UGDA); Wetlina, on bark of *Ulmus montana*, 12 Aug. 2001, *M. Kukwa 1069* (UGDA); Wyżnia Przełęcz pass, between Wetlina and Ustrzyki Górne villages, alt. 850 m, on bark of *Malus domestica*, 10 Apr. 1999, *B. Krzewicka 234* (KRAM).

CONCLUSIONS

The genus *Lepraria* is represented by 17 species in Poland, including the most recently described *L. toensbergiana* Bayerová & Kukwa (Kukwa 2004a; Bayerová *et al.* 2005). All but one – the very rare *L. umbricola* Tønsberg – occur in the Polish Carpathians, and 13 of them were found in the Beskid Sądecki Mts. The species not recorded in the studied area but known from other parts of the Carpathians are *L. cacuminum* (A. Massal.) Lohtander (Czarnota & Kukwa 2004; Kukwa 2004b), *L. nivalis* J. R. Laundon (Czarnota & Kukwa 2004) and *L. toensbergiana* (Bayerová *et al.* 2005). They may also occur unnoted in the studied area.

Two additional species are known from the Polish Carpathians but not from Beskid Sądecki Mts: *L. flavescens* Cl. Roux & Tønsberg (Bielczyk 1997; Kukwa 2003a, b) and *L. lesdainii* (Hue) R. C. Harris (Kukwa 2003a, b). Based on molecular study, the two species are excluded from the genus *Lepraria* (Ekman & Tønsberg

2003). At present they are known as *Lecanora rouxii* S. Ekman & Tønsberg (Grube *et al.* 2004) and *Botryolepraria lesdainii* (Hue) Canals, Hermández-Mariné, Gómez-Bolea & Llimona (Tønsberg 2002), respectively.

Revision of the entire Polish Carpathian collection of *Lepraria* (housed mostly in KRAM) resulted in many additional regional records. New data are supplied for the Pogórze Spisko-Gubałowskie foothills, Pogórze Wiśnickie foothills, Pogórze Ciężkowickie foothills, Pogórze Dynowskie foothills, Beskid Śląski Mts, Beskid Mały Mts, Beskid Żywiecki Mts, Beskid Makowski Mts, Beskid Wyspowy Mts, Gorce Mts, Beskid Niski Mts and Bieszczady Zachodnie Mts, adding much data to our knowledge of the distribution of *Lepraria* species in this part of Europe.

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