

LICHENS OF MIELNIK ON BUG RIVER (PODLASIE, EASTERN POLAND)

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ABSTRACT: A paper presents a list of 91 species found in Mielnik (personal data and from literature). Of these, 15 species are considered to be threatened in Poland. The lichen occur on all substrate types: soil surface, decaying wood (natural and antropogenic), bark of all trees and shrubs species, boulders, concrete, brickwork and mortar, bryophytes and metal. Valuable components of the lichen biota belong mostly to the group of threatened species not only on the regional, but also on the national scale. There are: *Caloplaca cerina*, *Cladonia symphylicarpa*, *Endocarpon pusillum*, *Placidium squamulosum* and others.

KEY WORDS: Lichens, floristics, distribution, Mielnik, Eastern Poland

Introduction

Investigations on lichens in Poland have been carried out in a large number of big and small towns, frequently of a health-resort character, situated in the lowlands as well as the mountains. On the territory of Poland lichen biota has been compiled for big cities, such as Lublin (Rydzak 1953), Radom (Cieśliński 1974), Warszawa (Zimny and Kucińska 1974), Kielce (Toborowicz 1976), Kraków (Kiszka 1977), Gdańsk, Sopot, Gdynia (Fałtynowicz et al. 1991), Rzeszów (Pustelniak 1991), Przemyśl (Kiszka 1999), Olsztyn (Kubiak 2005), Białystok (Matwiejuk 2007). However, data concerning small towns populated by up to a few thousand inhabitants are not numerous, e.g. for Muszyna, Wisła (Rydzak 1956a), Wołczyn (Rydzak 1956b), Białowieża (Rydzak 1957), Duszniki Zdrój, Polanica Zdrój (Rydzak 1959), Limanowa (Jagiełło 1983), Drezdenko (Lipnicki 1984), Ciechanowiec (Matwiejuk and Kolanko 2007).

The lichen biota of Mielnik has not been studied yet. Some tens lichen species from the cemetery in Mielnik and the regions from chalks mine have been reported by Cieśliński (2003a).

The aim of the study was to present flora documentation illustrating biodiversity of lichen biota in the area of Mielnik, taking into consideration the habitat conditions of species.

Study area

Mielnik, situated on the right slope of the Bug Valley (Dolina Bugu), lies on the Drohiczyn Plateau (Wysoczyzna Drohicka) encompassed by the macroregion – the Północnopodlaska Lowland (Nizina Północnopodlaska) (Kondracki 1994). The characteristic feature of the Mielnik location area is relatively shallow occurrence of Precambrian rocks. They are covered by rocks of the subsequent eras. The area of Mielnik location constitutes a part of the lowering called Podlasie Depression. The peculiarity of this part of Podlasie are Upper Cretaceous rocks, whose deposits emerge here from under the Quaternary deposit cover. Cretaceous deposits form extensive elevations in the shape of hummocks which rise up to 160m above sea level. Chalk deposits have been exploited here since time immemorial. Open pits in the nature reserve “Głogi” and those adjacent to the Castle Hill (Góra Zamkowa) are filled up at present. The only active open pit is located at Biała Street and stretches towards Mount Uszeście. Mainly Quaternary deposits lie directly on chalk surface: Middle Poland glaciation deposits (sands, gravels, clays, erratic boulders, stratified clays) as well as Holocene deposits (river alluvia and river valley peat). On the elevation in Mielnik they are separated by spreads of Tertiary deposits. Apart from chalk exploitation, Mielnik is famous for its interesting flora of vascular plants and its rich history. Celiński (1954) was the first one to draw attention to the flora of Mielnik surroundings, at the same time suggesting a project for its protection. On the territory of Podlasie Bug Water Gap (Podlaski Przełom Bugu), in the vicinity of Mielnik developed one of the richest communities of xerothermic lowland plants in Poland. They are characterised by geological conditions unique for the lowland area (occurrence of chalk rocks almost on the surface) and close relations with steppe flora refuges in Wołyń and Podole. The floristic material from the Middle Bug (Środkowy Bug) was collected by Ambrożewska (1965), Celiński (1961), Sokołowski (1973, 1991), Adamski and Łuczaj (1995). In 1985 nature reserve “Mount Uszeście” (“Góra Uszeście”) was founded, it is located in the north – eastern part of Mielnik. The aim of the reserve is protection of xerothermic plants containing in their composition a number of rare species and species under legal protection.

Material and Methods

The investigations in the area of Mielnik and its surroundings were carried out in the years 2007-2008, on 31 research stands (Fig.1, Fig.2). The alphabetical list of lichen species has been compiled. For each taxon we have specified the type of substratum it can be found on and the numbers of stands. Some tens lichen species from the cemetery in Mielnik (stand 10) and the regions from chalk mine (stand 13) have been reported by Cieśliński (2003a). The species confirmed by our own studies on that stand have been marked (Cieśliński 2003a) and exclamation mark (!). The species which have not been identified in the course of our own studies have been marked (Cieśliński 2003a).

The species have been named according to Santesson et al. (2003), genus *Melanelia* according to Blanco et al. (2004).

The lichen material has been deposited at the Herbarium of the Institute of Biology, University of Białystok.

Results

On the territory of Mielnik there have been recorded 91 lichen species of 51 genera. Lichens occur on all substrata likely to be colonized – on the bark of deciduous and coniferous trees and shrubs, rotting wood in forests, timber constructions, on mosses, soil, erratic boulders, stones, concrete, mortar and metal. The most abundant numbers of species represented here are those of genera *Lecanora* (11), *Caloplaca* and *Cladonia* (6 each) and *Physcia* (5).

Lichens colonize all the possible substrata – the bark of deciduous and coniferous trees and shrubs, decaying wood in the forest, timber structures, bryophytes, soil, erratic boulders, stones, concrete, mortar and metal.

Lichens are represented by all morphological forms. The dominant lichens in the biota of the investigated area are those forming different types of crustose thalli. They constitute 52% of the overall number of species. They occur mainly in shaded and moist places. Among the crustose lichens there is a considerable number of pioneer species which colonize anthropogenic rock substrata, smooth bark of trees and shrubs and freshly exposed soil. The second largest group are foliose lichens (27%) usually requiring larger quantity of illumination and mostly colonizing exposed places. Lichens with fruticose thalli are the less numerous group comprising 15% of the overall number of biota. Terricolous cup-mosses dominate among them. The lichen participation of other morphological groups is infrequent and amounts to about 3%.

Epiphytes. The bark of trees (15 species) and shrubs (4 species) constitutes a substratum for numerous lichens. Out of 91 lichen species recorded in the area under study, 47 grew on tree bark including 22 obligatory epiphytes. Roadside trees dominate in Mielnik, free-standing trees prevail in agricultural landscape. The richest lichenbiota has been recorded on the bark of deciduous trees. The lichenbiota of coniferous trees and shrubs – *Pinus sylvestris* (10 species) and *Juniperus communis* (3) – is relatively impoverished and slightly varied. The epiphytic biota of the poplar is of greater interest. Rare taxa have been identified on its bark, such as *Caloplaca cerina*, *Ramalina farinacea*, *R. fastigiata* and *R. pollinaria*. On most roadside trees, high participation in lichenbiota is exhibited by nitrophilous macrolichens of genera *Physcia* (*P. adscendens*, *P. dubia*, *P. stellaris*, *P. tenella*), *Physconia* (*P. enteroxantha*), *Ramalina* (*R. farinacea*, *R. fastigiata*, *R. fraxinea*) and *Xanthoria* (*X. parietina*, *X. polycarpa*). The rare species worth mentioning here include *Melanelixia subargentifera* (stand 13), *Ramalina fastigiata* (stand 9), *R. fraxinea* (stands 9, 10, 12, 14, 16, 23, 24), *Usnea hirta* (stands 9, 10, 31). The neighbourhood of the chalk pit within the range of dust with high alkaline reaction on the bark of tree trunks and branches of deciduous trees has been occupied on a large scale by *Xanthoria parietina*, *Caloplaca holocarpa* and *Lecania cyrtella*. The latter one also colonizes the bark of *Pinus sylvestris*.

Epilythes. The second largest habitat group – 38 species, comprises rock lichens, of which 25 are exclusive epilythes. They colonize both natural and anthropogenic substrata. Erratic boulders and stones can be found in the open area, agricultural landscape, as well as within the town and built-up areas (walls, underpinnings and gravestones)

and in the forest (reserve Mount Uszeście). Obligatory species include, among others *Acarospora veronensis*, *Diplotomma alboatrum*, *Neofuscelia pulla*, *Xanthoparmelia conspersa*, *Xanthoria elegans*. Rich lichenbiota occurs also on artificial substrata with properties resembling those of rocks, such as concrete, mortar and bricks. These become colonized by calciphilous species and also by species tolerant towards the presence of calcium carbonate, such as *Caloplaca citrina*, *C. decipiens*, *C. saxicola*, *Lecanora albescens*, *L. dispersa* and *Xanthoria parietina*. They are accompanied by numerous nitrophilous species of family *Physciaceae*. Lichens showing preference for tree bark can also be found on rock substrata, e.g. *Hypocenomyce scalaris*, *Hypogymnia physodes*, *H. tubulosa*, *Parmelia sulcata*. Cieśliński (2003a) records *Placynthium nigrum* on a cemetery gravestone, a place which is moist and well exposed to sunlight. It is the second stand of this species in north-eastern Poland.

Epixyloous lichens are represented by 26 species. On the territory of Mielnik lichens of dead and rotting wood favour mainly man-made timber constructions (fences, poles, crosses and farm outbuildings). The most frequently recorded were: *Hypogymnia physodes*, *Lecanora conizaeoides*, *Parmelia sulcata*, *Phaeophyscia orbicularis* and *Xanthoria parietina*. Lichens growing exclusively on timber constructions included among others: *Lecanora varia*, *Micarea denigrata* and *Placynthiella icmalea*.

Rotting wood of natural origin in the adjacent forests is the substratum favoured by a small number of lichens (5 species). These are mainly species of genus *Cladonia*.

Epigeits. Soil is colonized by 13 lichen species of 7 genera. The dominant ones are terricolous cup-mosses (*Cladonia* – 5 species). Exclusive epigeits include 11 species. Terricolous lichens in the investigated area can be encountered outside urban settlements, in forest fragments and on xerothermic grass, on soil, often rich in calcium carbonate.

Epibryophytes. 2 lichen species have been found on mosses. These comprise *Lepraria incana* and *Mycobilimbia tetramea*.

Other substrata. In the vicinity of the chalk pit, metal constructions have been colonized on a large scale by *Xanthoria parietina*.

Participation of vulnerable and protected lichens

Of the 91 lichen species identified in Mielnik and its environs, 15 species have been put on the Red List of extinct and vulnerable lichens of Poland (Cieśliński et al. 2003), including 3 species in the endangered category – EN (*Cetraria sepincola*, *Ramalina fastigiata*, *R. fraxinea*), 7 species in the vulnerable category – VU (*Caloplaca cerina*, *Endocarpon pusillum*, *Melanelixia subargentifera*, *Tuckermanopsis chlorophylla*, *Ramalina farinacea*, *R. pollinaria*, *Usnea hirta*), 5 species in the category of near threatened – NT (*Evernia prunastri*, *Hypogymnia tubulosa*, *Neofuscelia pulla*, *Placidium squamulosum*, *Placynthium nigrum*), as well as 4 species on the Red List of lichens vulnerable in north-eastern Poland (Cieśliński 2003b), including 1- EN (*Caloplaca cerina*), 1 – VU (*Cladonia symphylicarpia*), 1 - NT (*Endocarpon pusillum*) and 1 – LC (*Placidium squamulosum*).

The level of threat for lichens in north-eastern Poland, compared to other regions in lowland Poland is lower, which is reflected in a small number of vulnerable lichens in Mielnik placed on the local Red List (Cieśliński 2003b) compared to the national Red List (Cieśliński et al. 2003).

Of all the 91 lichen species of Mielnik and its surroundings, 18 have been put under legal protection, 17 of which are totally and 1 of which are partially protected. *Usnea*

hirta is a species which requires a protection zone to be established within a 50- metre radius from the stand border.

Index of stands

1. The self-governed holiday center in the area Group Naturally – Landscape „Głogi” – *Betula pendula*, concrete posts.
2. The group Naturally – Landscape „Głogi” – *Betula pendula*, *Populus tremula*, *Quercus robur*, soil.
3. Ul. Brzeska – concrete bases, posts.
4. Castle Hill (Góra Zamkowa), ruins of locking churches - *Acer platanoides*, *Fraxinus excelsior*, *Betula pendula*, *Aesculus hippocastanum*, concrete posts.
5. Ul. Widokowa, logs at church – stones, stone wall.
6. Ul. Brzeska, near mine of chalk – *Pinus sylvestris*, wooden crosses.
7. Ul. Brzeska, near cinema Górnik – roadside *Tilia cordata*, concrete posts.
8. Ul. Brzeska, roman catholic church under invocation Przemienienia Pańskiego - concrete wall, stairs, *Tilia cordata*.
9. Uroczysko „Topolina”, amphitheater over river Bug – *Populus alba*, *Salix alba*.
10. Ul. Cerkiewna, orthodox cemetery – *Tilia cordata*, *Betula pendula*, concrete, stone tombstones, wooden crosses and benches (in Cieśliński 2003a, stand 163).
11. Ul. Cerkiewna, orchard at orthodox church – *Malus* sp., wooden fences.
12. Orthodox church under invocation Narodzenia Bogurodzicy – wooden, concrete crosses, *Tilia cordata*, *Quercus robur*.
13. The area around mine of chalk (in Cieśliński 2003a, stand 164).
14. Ul. Polna – *Salix alba*, wooden fences.
15. Cross-road ul. Polna and Ul. Sadowa – wooden fences, field stones, *Salix alba*, *Quercus robur*.
16. Ul. Sadowa – *Populus tremula*.
17. Ul. Ścianki – *Populus tremula*.
18. Ul. Popław – *Betula pendula*, *Quercus robur*, *Populus tremula*, *Pinus sylvestris*, soil.
19. Ul. Przemysłowa – *Salix alba*.
20. Ul. Biała – *Prunus spinosa*, *Rhamnus catharticus*, *Juniperus communis*, *Pinus sylvestris*.
21. Ul. Biała, directly at chalk pit – *Populus tremula*, *Pyrus* sp., *Betula pendula*, concrete posts, stones.
22. Nature reserve “Mount Uszeście” – *Pinus sylvestris*, *Betula pendula*, *Prunus spinosa*, *Corylus avellana*, *Populus tremula*, *Cornus sanguinea*, *Carpinus betulus*, *Juniperus communis*, *Tilia cordata*, stumps, wooden constructions, stones.
23. Ul. Królewska – *Quercus robur*, stone wall.
24. Ul. Królewska, square – *Populus tremula*, *Fraxinus excelsior*, stones, concrete posts.
25. Square Tadeusza Kościuszki – *Ligustrum vulgare*, *Fraxinus excelsior*, *Salix alba*.
26. Ul. Krótka – *Pyrus* sp., concrete wall.
27. Ul. Zamiejska – *Populus tremula*, *Quercus robur*.
28. Cross-road of street: ul. Zamiejska, Mostowa and Brzeska – concrete posts.
29. Ul. Piaskowa – concrete posts, *Malus* sp., *Betula pendula*.
30. Ul. Graniczna – *Betula pendula*.
31. Ul. Przemysłowa, catholic cemetery under invocation Przemienienia Pańskiego – concrete wall, tombstones, wooden crosses, *Thuja occidentalis*.

Species index

1. *Acarospora fuscata* (Schrad.) Th. Fr. – stones and tombstones
Stands: 10 (Cieśliński 2003a), 15, 22
2. *Acarospora veronensis* A. Massal. – stones
Stand: 10 (Cieśliński 2003a)
3. *Amandinea punctata* (Hoffm.) Coppins & Scheid. in Scheidegger – bark of *Tilia cordata*, *Salix alba*, *Populus tremula*, *Prunus spinosa* and wooden constructions
Stands: 8, 9, 10! (Cieśliński 2003a), 11, 12, 13! (Cieśliński 2003a), 14, 22, 25
4. *Aspicilia calcarea* (L.) Mudd – concrete constructions
Stands: 4! (Cieśliński 2003a), 13! (Cieśliński 2003a), 24, 29, 31
5. *Aspicilia cinerea* (L.) Körb. – stones
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6. *Bacidia bagliettoana* (A. Massal. & De Not.) Jatta - soil
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7. *Diplotomma alboatrum* (Hoffm.) Flot. (syn. *Buellia ambigua*) – stones
Stand: 10 (Cieśliński 2003a)
8. *Buellia griseovirens* (Turner & Borrer ex Sm.) Almb. – bark of *Populus tremula* and *Tilia cordata*
Stands: 9, 10
9. *Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr. – bark of *Populus tremula*
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10. *Caloplaca citrina* (Hoffm.) Th. Fr. – concrete bases, posts, gravestones and stone wall
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11. *Caloplaca decipiens* (Arnold) Blomb. & Forssell – concrete constructions, posts and gravestones
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12. *Caloplaca holocarpa* (Hoffm. ex Ach.) A.E. Wade – concrete posts, gravestones, stones, bark of *Fraxinus excelsior*, *Malus* sp., *Prunus spinosa*, *Quercus robur* and *Cornus sanguinea*
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19. *Cetraria sepincola* (Ehrh.) Ach. – bark of *Betula pendula*
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20. *Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng. – decaying wood
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22. *Cladonia fimbriata* (L.) Fr. – bark of *Betula pendula*, wooden constructions, stumps, soil and stones
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29. *Evernia prunastri* (L.) Ach. – bark of *Acer platanoides*, *Fraxinus excelsior*, *Salix alba*, *Quercus robur*, *Populus alba*, *Tilia cordata*, *Prunus spinosa*, *Betula pendula* and wooden constructions
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37. *Lecanora carpinea* (L.) Vain. – bark of *Populus tremula*, *Acer platanoides*, *Fraxinus excelsior*, *Quercus robur* and *Prunus spinosa*
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Stands: 4, 6, 9, 15, 22
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Stands: 1, 2, 4, 9, 10, 14, 18, 22, 23, 29, 31
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Stand: 13 (Cieśliński 2003a)
50. *Melanelixia fuliginosa* (Fr. ex Duby) O. Blanco et al. – bark of *Populus tremula*, *Betula pendula*, *Acer platanoides*, *Fraxinus excelsior*, *Tilia cordata*, *Malus* sp., *Quercus robur*, *Salix alba*, *Pyrus* sp. and *Prunus spinosa*
Stands: 1, 2, 4, 10, 11, 12, 14, 16, 18, 21, 22
51. *Melanelixia fuliginosa* (Fr. ex Duby) O. Blanco et al. ssp. *glabratula* (Lamy) J. R. Laundon – bark of trees
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Stand: 13 (Cieśliński 2003a)
53. *Melanohalea exasperatula* (Nyl.) O. Blanco et al. – bark of *Salix alba* and wooden fences
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54. *Micarea denigrata* (Fr.) Hedl. – decaying wood
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55. *Mycobilimbia tetramera* (De Not.) Vitik. et al. in Hafellner & Türk – bryophytes
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57. *Parmelia sulcata* Taylor – bark of *Populus tremula*, *Betula pendula*, *Quercus robur*, *Tilia cordata*, *Salix alba*, *Populus alba*, *Acer platanoides*, *Fraxinus excelsior*, *Pinus sylvestris*, *Malus* sp., *Prunus spinosa*, *Juniperus communis*, wooden crosses, fences and stones
Stands: 1, 2, 4, 6, 7, 8, 9, 10! (Cieśliński 2003a), 11, 12, 13! (Cieśliński 2003a), 14, 15, 17, 18, 19, 22, 23, 25, 27, 29, 31
58. *Parmeliopsis ambigua* (Wulfen) Nyl. – bark of *Betula pendula* and wooden crosses
Stands: 1, 2, 10, 31
59. *Peltigera didactyla* (With.) J.R. Laundon - soil
Stand: 13 (Cieśliński 2003a)
60. *Peltigera rufescens* (Weiss) Humb. - soil
Stands: 2, 5, 13! (Cieśliński 2003a)
61. *Pertusaria albescens* (Huds.) M. Choisy & Werner in Werner – bark of *Tilia cordata*
Stand: 10
62. *Pertusaria amara* (Ach.) Nyl. – bark of *Fraxinus excelsior* and *Tilia cordata*
Stands: 4, 10
63. *Phaeophyscia nigricans* (Flörke) Moberg – concrete posts, gravestones and stones
Stands: 1, 12, 13! (Cieśliński 2003a), 21, 24, 28, 29, 31
64. *Phaeophyscia orbicularis* (Neck.) Moberg – concrete posts, gravestones, stones, bark of *Fraxinus excelsior*, *Tilia cordata*, *Populus alba*, *P. tremula*, *Salix alba*, *Malus* sp., *Quercus robur*, *Ligustrum vulgare*, *Salix alba*, *Cornus sanguinea*, *Prunus spinosa* and wooden fences
Stands: 1, 4, 5, 8, 9, 10! (Cieśliński 2003a), 11, 12, 14, 15, 16, 17, 21, 22, 24, 25, 27, 28, 29, 31
65. *Phlyctis argena* (Spreng.) Flot. – bark of *Acer platanoides*, *Fraxinus excelsior*, *Populus alba*, *P. tremula*, *Salix alba*, *Betula pendula*, *Tilia cordata* and *Quercus robur*
Stands: 4, 8, 9, 10! (Cieśliński 2003a), 12, 14, 22, 23, 24, 25
66. *Physcia adscendens* H. Olivier nom. cons. – bark of *Populus tremula*, *Salix alba*, *Malus* sp., *Acer platanoides*, *Tilia cordata*, *Ligustrum vulgare*, *Quercus robur*, *Pyrus* sp., *Fraxinus excelsior*, stone wall, stones, concrete posts, gravestones and wooden crosses
Stands: 1, 2, 4, 5, 7, 8, 9, 10! (Cieśliński 2003a), 11, 12, 15, 21, 22, 24, 25, 29
67. *Physcia caesia* (Hoffm.) Fűrnr. – stones and concrete tombstones
Stands: 5, 10, 13! (Cieśliński 2003a), 15, 31
68. *Physcia dubia* (Hoffm.) Lettau – bark of *Populus tremula*, *Acer platanoides*, *Fraxinus excelsior*, *Tilia cordata*, *Quercus robur*, *Malus* sp., *Salix alba*, *Thuja occidentalis*, *Prunus spinosa*, stone wall, concrete posts, gravestones, wooden crosses and fences
Stands: 1, 2, 4, 5, 7, 10! (Cieśliński 2003a), 11, 12, 13! (Cieśliński 2003a), 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 27, 29, 31
69. *Physcia stellaris* (L.) Nyl. – bark of *Populus tremula*, *Tilia cordata*, *Populus alba*, *Malus* sp., *Fraxinus excelsior*, *Prunus spinosa*, *Ligustrum vulgare*, *Quercus robur* and *Pyrus* sp.
Stands: 1, 2, 7, 9, 10! (Cieśliński 2003a), 11, 13! (Cieśliński 2003a), 15, 18, 20, 21, 22, 25, 26, 29
70. *Physcia tenella* (Scop.) DC. – bark of *Populus tremula*, *Quercus robur* and *Malus* sp.
Stands: 13! (Cieśliński 2003a), 22, 24, 27, 29

71. *Physconia enteroxantha* (Nyl.) Poelt – bark of *Tilia cordata*, *Populus alba*, *P. tremula*, *Salix alba*, *Malus* sp., *Salix alba* and *Prunus spinosa*
Stands: 8, 9, 10 (Cieśliński 2003a), 11, 14, 16, 22, 25
72. *Placidium squamulosum* (Ach.) Breuss – soil (xerothermic grasses)
Stand: 13 (Cieśliński 2003a)
73. *Placynthiella icmalea* (Ach.) Coppins & P. James – wooden constructions
Stand: 22
74. *Placynthium nigrum* (Huds.) Gray - cemetery tombstone, in wet, bright place
(second stand of occurrence in north-eastern Poland)
Stand: 10 (Cieśliński 2003a)
75. *Porpidia crustulata* (Ach.) Hertel & Knoph in Hertel – stones
Stands: 13! (Cieśliński 2003a), 15, 22, 23
76. *Protoparmeliopsis muralis* (Schreb.) M. Choisy – gravestones and stones
Stands: 10! (Cieśliński 2003a), 13! (Cieśliński 2003a), 15, 22, 24, 31
77. *Pseudevernia fufuracea* (L.) Zopf – bark of *Populus alba*, *Salix alba* and wooden crosses
Stands: 9, 10! (Cieśliński 2003a), 31
78. *Ramalina farinacea* (L.) Ach. – bark of *Populus alba*, *Salix alba*, *Tilia cordata* and *Quercus robur*
Stands: 9, 10, 12, 14
79. *Ramalina fastigiata* (Pers.) Ach. – bark of *Populus alba* and *Salix alba*
Stand: 9
80. *Ramalina fraxinea* (L.) Ach. – bark of *Populus alba*, *P. tremula*, *Salix alba*, *Tilia cordata*, *Quercus robur* and *Fraxinus excelsior*
Stands: 9, 10! (Cieśliński 2003a), 12, 14, 16, 23, 24
81. *Ramalina pollinaria* (Westr.) Ach. – bark of trees
Stand: 10 (Cieśliński 2003a)
82. *Rinodina pyrina* (Ach.) Arnold – bark of *Prunus spinosa*
Stand: 13 (Cieśliński 2003a), 20
83. *Sarcogyne regularis* Körb. – slight stones and concrete
Stands: 13 (Cieśliński 2003a), 31
84. *Scoliciosporum chlorococcum* (Graewe ex Stenh.) Vězda – bark of *Betula pendula*, *Aesculus hippocastanum*, *Tilia cordata*, *Salix alba*, *Pinus sylvestris* and *Quercus robur*
Stands: 1, 2, 4, 8, 9, 10, 12, 18, 22, 29, 30
85. *Tuckermanopsis chlorophylla* (Willd.) Hale – bark of *Fraxinus excelsior*
Stand: 4
86. *Usnea hirta* (L.) Weber ex F. H. Wigg. – bark of *Populus tremula* and wooden crosses
Stands: 9, 10! (Cieśliński 2003a), 31
87. *Verrucaria muralis* Ach. – slight stones
Stand: 10
88. *Verrucaria nigrescens* Pers. – concrete posts, gravestones and stone wall
Stands: 4, 5, 10, 23, 31
89. *Xanthoparmelia conspersa* (Ach.) Hale - stones
Stands: 5, 13! (Cieśliński 2003a), 22
90. *Xanthoria elegans* (Link) Th. Fr. – concrete posts and walls
Stands: 1, 13! (Cieśliński 2003a), 21, 31
91. *Xanthoria parietina* (L.) Th. Fr. – bark of *Populus tremula*, *P. alba*, *Betula pendula*, *Fraxinus excelsior*, *Malus* sp., *Quercus robur*, *Tilia cordata*,

Salix alba, *Prunus spinosa*, *Pyrus* sp., *Cornus sanguinea*, concrete posts, stone wall, stones, gravestones, wooden constructions and metal
Stands: 1, 2, 4, 5, 7, 9, 10! (Cieśliński 2003a), 11, 12, 14, 15, 16, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 31

92. *Xanthoria polycarpa* (Hoffm.) Th. Fr. ex Rieber – bark of *Fraxinus excelsior*, *Tilia cordata*, *Populus alba*, *Quercus robur*, *Salix alba*, *Prunus spinosa*, *Malus* sp., *Pyrus* sp., concrete tombstones and wooden constructions
Stands: 4, 7, 9, 10! (Cieśliński 2003a), 11, 12, 15, 22, 23, 25, 26, 28.

Discussion

As far as the number of lichen biota species of Mielnik is concerned – 91 is close to that of Ciechanowiec – 113 (Matwiejuk and Kolanko 2007), a small town situated in the w Podlaskie Province, on Mazowiecka-Podlaska Lowland. The lichen biota of other towns with a similar number of inhabitants as Mielnik documented in literature (Rydzak 1956 a,b,1957, 1959; Jagiełło 1983), is characterized by a poorer species composition of lichens. The analysed towns differ due to a significant number of species growing on the bark of trees and shrubs (Białowieża – 68 species, Limanowa – 60, Ciechanowiec – 55, Mielnik – 47, Drezdenko – 39). Among the lichens colonizing secondary rock substrata the most frequently represented habitat group are calciphilous lichens bound up with concrete. Terricolous lichens have been found outside urban settlements, primarily in forest fragments. Mielnik, just as many other towns has preserved in its centre old buildings and other timber structures connected with them. These have been colonized by lichens which exhibit preference for organic substrata. In all of the towns, a group of species can be differentiated, the ones which have found here optimal living conditions. These are common nitrophilous lichens, coniphilous lichens of order *Buelliales* and of family *Lecanoraceae*, frequently growing in large populations. The lichen biota of Mielnik is unique for its large number of now rare and vulnerable species, which were registered by Rydzak (1956 a, b, 1957, 1959) in small towns of Poland over half a century ago. These are the species which are currently absent in large urban areas.

Cieśliński (2003a) recorded a few thermophilous lichens in the surroundings of Mielnik, on xerothermic grass: *Bacidia bagliettoana* – growing directly on soil, *Caloplaca cerina* – rare on mosses, *Cladonia pocillum* – on soil, *Endocarpon pusillum* – in loose, pioneer stages of xerothermic grass formation, *Placidium squamulosum* – on mosses, in small numbers. In the course of investigations in Mielnik, on Mount Uszeście among other places, these species have not been recorded on xerothermic grass. The reason for this is probably an increasing process of brushwood overgrowing grasses, appearance of self-sown pines and other trees, and aslo flora ruderalization. According to Cieśliński (2003a) these species tend to appear ephemerally and vanish along with the progress of succession processes.



Fig. 1. Location of Mielnik in Poland

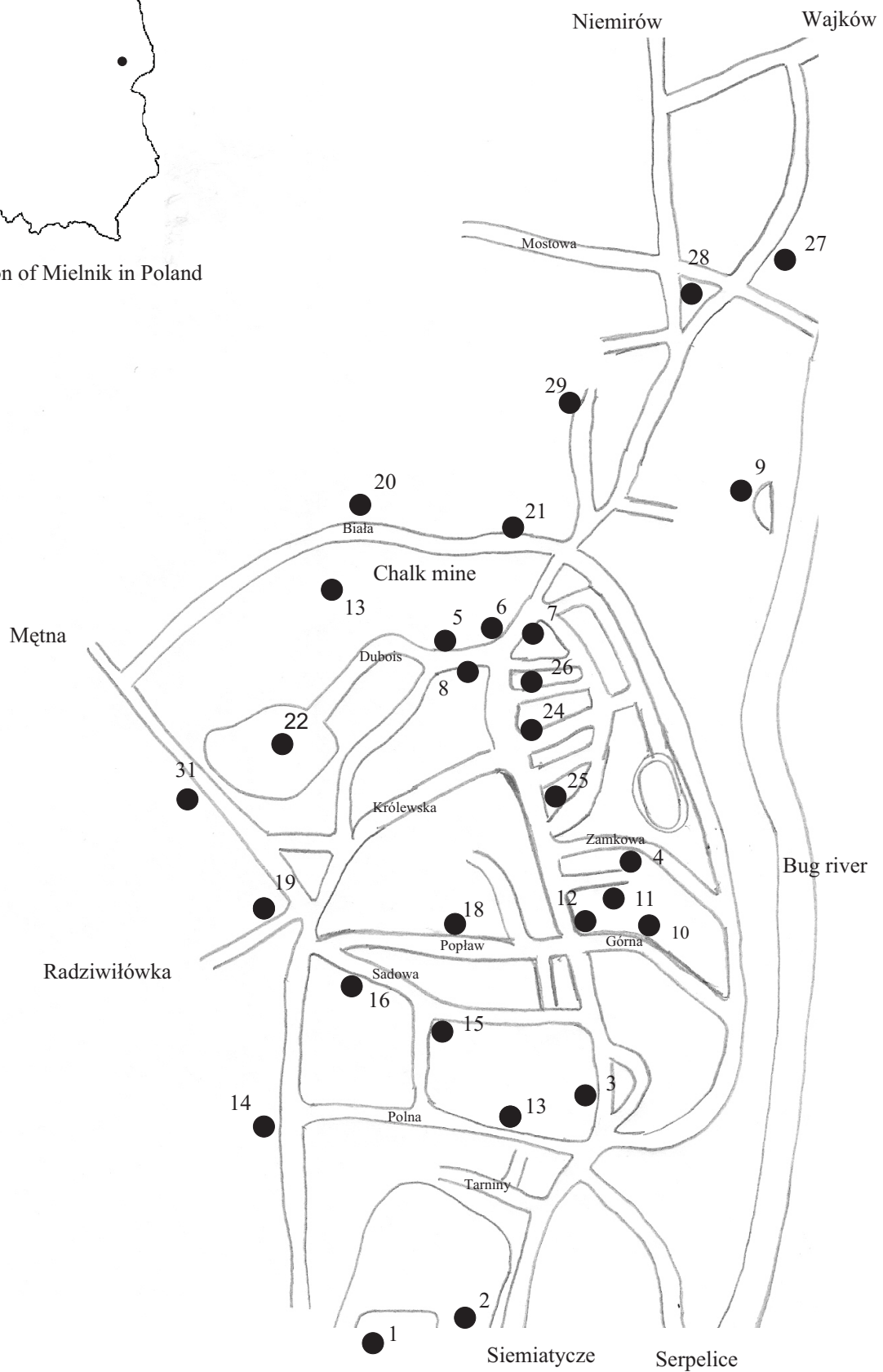


Fig. 2. Locations of the stands of lichens in Mielnik (numbers according to the text)

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