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Recent collections of powdery mildews (Erysiphales) in Poland

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Findings on the occurrence of 17 species of powdery mildews in Poland and Europe, collected on 37 plant taxa (species, varieties), are reported. Eight species were found on 13 host species not noted in Europe before. 24 species of plants are new hosts for these fungi in Poland. The greatest number of plants (10 species) was infected by *Erysiphe berberidis*.

Key words: parasitic microfungi, Erysiphales, Ascomycota, distribution

INTRODUCTION

Distinctive infection symptoms, easiness with which they can be observed and damage caused to cultivated plants make powdery mildews (Erysiphales) particularly interesting to mycologists and phytopathologists. It is a group examined well, both in Poland and in the world (e.g. Sałata 1985; Braun 1987, 1995). First findings on the occurrence of Erysiphales in Poland come from 1855, while a comprehensive monograph study on the subject was published in 1985 (Sałata 1985).

An increase in the number of reports of powdery mildews has been observed in recent years. Findings are indicative of an exceptionally quick spread of these fungi in the world, including Poland and Europe. The number of newly described species has been increasing, although to a small extent. However, reports on new localities of these fungi, infections of new host plants and quick spread of some species, including migrations of successive Asian and North-American species, have become more numerous. Teleomorphic stages of these fungi which for many years occurred only in conidial stages have also been found (review of literature, see Wołczańska and Mułenko 2002). These features may indicate a quick adaptation of powdery mildews to new habitat conditions as well as the invasive nature of representatives of this group (Mułenko et al. unpubl.).

The description and remarks on the distribution of 17 species of powdery mildews collected on successive 37 taxa (species or varieties) of vascular plants, collected mostly in eastern Poland, are presented. The majority of the fungi listed are polyphagous, known well in Poland, Europe and in the world. However, they have not been reported on the plants listed below or they have been known from a single locality or few localities. Only those species whose number of localities on a specific host did not exceed 5 for entire Poland are given. A general distribution in Europe is also provided for each species.

Those species that occur on plant hosts new for these fungi in Europe constitute the most important group. 13 plant taxa belong here: *Berberis amurensis* var. *japonica*, *B.* x *chopinii* 'Mazurek', *B. lycioides*, *B.* x *ottawensis* 'Purpurea', *B. vulgaris* 'Atropurpurea' and *B. wilsoniae* var. *subcaulialata* (infected by *Erysiphe berberidis*), *Monarda fistulosa* (infected by *Golovinomyces biocellatus*), *Erysimum marschalianum* (infected by *Erysiphe cruciferarum*), *Euonymus europeaus* var. *alba* (infected by *Erysiphe euonymi*), *Heracleum sosnowskyi* (infected by *Erysiphe heraclei*), *Cornus stolonifera* 'Flaviramea' (infected by *Erysiphe tortilis*), *Sambucus nigra* var. *laciniata* (infected by *Erysiphe vanbruntiana* var. *sambuci racemosae*) and *Inula macrocephala* (infected by *Golovinomyces cichoracearum* var. *cichoracearum*).

Fungi collected in Poland on plants not infected by powdery mildews before are an interesting group. As many as 24 plant species (66% of collected species) are hosts new for these fungi. Except from the plants given above, these also are: *Delphinium cuneatum* (infected by *Erysiphe aquilegiae* var. *ranunculi*), *Berberis bretschneideri*, *B. lycium*, *B. morrisonensis*, *B. vernae* (infected by *Erysiphe berberidis*), *Ajuga chamaepitys* and *Monarda fistulosa* (infected by *Golovinomyces biocellatus*), *Fumaria officinalis* (infected by *Erysiphe cruciferarum*), *Vinca minor* (infected by *Golovinomyces orontii*), *Acer ginnala* (infected by *Sawadaea tulasnei*) and *Senecio macrophyllus* (infected by *Golovinomyces cichoracearum* var. *cichoracearum*).

Detailed descriptions of the fungi examined are given in several monograph studies (e.g. Braun 1987, 1995; Sałata 1985). Morphology of specimens found in Poland is consistent with these descriptions. Therefore, a full description of all species is not given but only the most important and most characteristic features of their morphological structure are emphasised.

Nomenclature of the fungi is given acc. to Gelyuta (1988), Braun (1999) and the latest study by Braun and Takamatsu (2000), based on molecular examinations of the ITS rDNA sequence. Names used before (Braun 1995) are given as synonyms. Nomenclature of the host plants is adjusted to the latest edition of *Checklist of vascular plants and pteridophytes of Poland* (Mirek et al. 2002). Geographic regions of Poland are given acc. to Kondracki (1998).

All samples cited in the part „Host and locality" were deposited in mycological herbarium (LBLM) in Department of Botany and Mycology of Maria Curie–Skłodowska University (Lublin, Poland).

LIST OF SPECIES AND LOCALITIES

Erysiphe aquilegiae var. *ranunculi* (Grev.) Zeng & Chan

Mycelium amphigenous on the leaves and stems, evanescent, without conidophores and conidia. Chasmothecia numerous, usually gregarious, less frequently scattered, dark brown, diam. 78–102 μm. Appendages few, 9–16, brownish, slightly flexuous, most frequently 1–4 times longer than chasmothecium diameter. Asci 5–7, ellipsoid or ovoid, 52–66 × 32–44 μm, 3–6-spored. Ascospores ellipsoid, 13–24 × 10–16 μm.

Hosts and localities: On *Clematis integrifolia* L.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. A. Wołczańska (LBLM 8552);

on *Delphinium cuneatum* Steven ex DC.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 26.07.2000, 29.09.2002, leg. W. Mułenko, det. U. Świderska (LBLM 8520, 8521, 8551);

on *Thalictrum lucidum* L.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 26. 07. 2000, leg. W. Mułenko, det. U. Świderska (LBLM 8522);

on *Thalictrum minus* L.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. A. Wołczańska (LBLM 8496).

Remarks. The fungus has not been recorded on *Delphinium cuneatum* Steven ex DC. in Poland before. On *Clematis integrifolia* L. known from one locality only (Dzierżoniów); on *Thalictrum minus* L. also from one locality (Księte near Lipno), and on *Thalictrum lucidum* L. from two localities (Rębków near Garwolin and Pojezierze Łęczyńsko–Włodawskie lake district) (Sałata 1985, Mułenko 1988).

E. aquilegiae var. *ranunculi* is frequently noted in Poland. This powdery mildew has been recorded so far on 38 species of host plants. Sałata (1985) listed 30 host plants for this species (*Paeonia officinalis* was excluded – Piątek 2004a), and 8 have been added: *Aconitum lasiocarpum* (Rchb.) Gáyera (Wołczańska and Oklejewicz 2001), *Aconitum plicatum* Köhler ex Rchb. (Piątek 2004a), *Consolida ajacis* (L.) Schur (Czerniawska 2001, Adamska 2002), *Delphinium oxysepalum* Borbás et Pax (Sałata, Romaszewska-Sałata, Mułenko 1993), *Nigella damascena* L. (Adamska 2002), *Ranunculus arvensis* L. (Adamska 2001), *Ranunculus oreophilus* M. Bieb. (Sałata et al. 1984), *Ranunculus polyanthemos* L. (Romaszewska-Sałata and Mułenko 1983).

The fungus has been noted relatively frequently on the plant species listed in Europe. It is known on *Clematis integrifolia* from 7 countries, on *Thalictrum lucidum* from 9 countries, and on *Thalictrum minus* from 14 countries (Braun 1995). It occurs rarely only on *Delphium cuneatum*; it has been reported on this plant only from the former Soviet Union (Braun l.c.).

Erysiphe berberidis DC.
= *Microsphaera berberidis* (DC. ex Mérat) Trev.

The fungus infects leaves and, to a smaller degree, shoots and fruits, covering them with a whitish coating. Conidia cylindric, 25–37 × 11.5–15 μm. Chasmothecia dark brown, diam. 90–126 μm, scattered or gregarious. Appendages fairly numerous (8–18), hyaline, 2–4 times dichotomously branched and obtuse at the ends, 1–3

(most frequently 1.5) times longer than chasmothecium diameter. Asci 4–8, ovoid, 44–58 × 28–32 μm. Ascospores 4–5(-6), ellipsoid, 16–24 × 9–10 μm.

Braun (1987) distinguished two varieties within this species: *Microsphaera berberidis* (DC.) Lév. var. *berberidis* and *Microsphaera berberidis* (DC.) Lév. var. *asiatica* U. Braun, differentiated by the appendage length. Appendages in *Microsphaera berberidis* var. *berberidis* are 1-3 times (most frequently 1.5-2 times) longer than the chasmothecium diameter. Appendages of this length were observed on barberry species occurring in Europe. *Microsphaera berberidis* var. *asiatica* is characterised by shorter appendages (1-2, most frequently 1-1.5 times longer than the chasmothecium diameter) and it was found on species occurring in Asia. In present collection mature chasmothecia occurred only very rarely and the appendages were most frequently 1.5 times longer than the chasmothecium diameter. It was impossible to specify the variety on the basis of the material collected. It seems, however, to be *Microsphaera berberidis* var. *berberidis*. Additional observations are needed at the future.

Hosts and localities: On *Berberis amurensis* Rupr. var. *japonica* (Reg.) Rehd.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. M. Mamczarz (LBLM 8498);

on *Berberis bretschneideri* Rehd.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. M. Kozłowska (LBLM 8499);

on *Berberis* x *chopinii* Seneta 'Mazurek': Wyżyna Lubelska upland, Lublin-LSM, 04.10.2004, leg. et det. M. Kozłowska (LBLM 8500); Puławy-Gościńczyk, 03.10.2004, leg. et det. U. Świderska (LBLM 8501);

on *Berberis lycioides* Stapf: Wyżyna Lubelska upland, Lublin, Botanical Garden, 26.07.2000, leg. W. Mułenko, det. U. Świderska (LBLM 8524);

on *Berberis lycium* Royle: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. M. Kozłowska (LBLM 8503);

on *Berberis morrisonensis* Hayata: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. M. Kozłowska (LBLM 8504);

on *Berberis* x *ottawensis* Schn. 'Purpurea': Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. U. Świderska (LBLM 8505);

on *Berberis vernae* Schn.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. U. Świderska (LBLM 8506);

on *Berberis vulgaris* L. 'Atropurpurea': Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. M. Mamczarz (LBLM 8507, 8508);

on *Berberis wilsoniae* Hemsl. et Wills. var. *subcaulialata* Schn.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. U. Świderska (LBLM 8509);

on *Mahoberberis neuberti* C. K. Schneid.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 08.08.2002, leg. W. Mułenko, det. U. Świderska (LBLM 8523).

Remarks. The fungus has been reported only on 6 plant species in Poland, including 4 species of the genus *Berberis* L. (*B. amurensis* Rupr., *B. koreana* Palibin, *B. thunbergii* DC., *B. vulgaris* L.) (Sałata 1985; Romaszewska-Sałata, Sałata, Mułenko 1986; Dynowska et al. 1999; Czerniawska et al. 2000; Piątek 2004a), on *Mahonia aquifolium* Nutt. (Sałata 1985; Dynowska, Fiedorowicz, Kubiak 1999; Czerniawska 2001) as well as on *Mahoberberis neuberti* C. K. Schneid. (Romaszewska-Sałata et al. 1986, Piątek 2004a). All the spe-

cies and varieties of the barberry reported in the present study are new hosts of the parasite in Poland.

The fungus has not been reported on *Berberis amurensis* var. *japonica*, *B.* x *chopinii* 'Mazurek', *B. lycioides*, *B.* x *ottawensis* 'Purpurea', *B. vulgaris* 'Atropurpurea' and *B. wilsoniae* var. *subcaulialata* in Europe before. It has been reported, however, on *Berberis. lycium* from Romania, on *B. bretschneideri*, *B. morrisonensis* and *B. vernae* from the Great Britain, and on *B. amurensis* and *B. wilsoniae* from the Great Britain and Romania. The species has been noted most frequently on *B. vulgaris* (19 European countries) and on *Mahoberberis neuberti* (8 countries) (Braun 1995).

Erysiphe cruciferarum Opiz ex L. Junell

The fungus infects both leaves and stems, sometimes fruits, covering them with a white, arachnoid, farinose coating. Conidia cylindrical or cylindrical-ellipsoid, 29–34 × 11–14 μm, solitary, rarely in short chains. Chasmothecia very few, immature.

Hosts and localities: On *Erysimum marschallianum* Andrz. ex M. Bieb.: Wyżyna Lubelska upland, Lublin, on railway lines near FSC, 18.07.1993, leg. F. Święs, det. A. Wołczańska (LBLM 8514);

on *Erysimum pieninicum* (Zapał.) Pawł.: Kotlina Sandomierska basin, Bolestraszyce Arboretum, 08.06.2001, leg. W. Mułenko, det. U. Świderska (LBLM 8527);

on *Fumaria officinalis* L.: Roztocze, Chełmowa Góra reserve near Krasnobród, stony slope, 28.09.2002, leg. W. Mułenko, det. U. Świderska (LBLM 8528);

on *Lunaria rediviva* L.: Beskid Niski Mts, Cergowa Góra Mt., in *Dentario glandulosae-Fagetum* (=*Fagetum carpaticum*), 02.07.1993, leg. et det. A. Wołczańska (LBLM 8515).

Remarks. The fungus has not been noted on *Erysimum marschalianum* Andrz. ex M. Bieb. and *Fumaria officinalis* L. in Poland so far. On *Erysimum pieninicum* (Zapał.) Pawł. has been reported only from the Wzgórze Zamkowe hill in Czorsztyn (Sałata 1985) and from Krościenko on Dunajec (Piątek 2004a), and on *Lunaria rediviva* L. from the Pieniny Mts. and Krynica (Sałata 1985). The fungus occurs commonly in Poland and has been reported on 33 plant species so far. Sałata (1985) listed 28 host plants for this species and 5 have been added: *Brassica oleracea* L. ssp. *capitata* (L.) Duchesne (Dynowska et al. 1999), *Brassica rapa* L. subsp. *rapa* (Czerniawska 2001), *Cardaminopsis arenosa* (L.) Hayek (Mułenko 1988), *Lepidium latifolium* L. (Piątek 2004a), *Raphanus raphanistrum* L. (Adamska 2001).

The fungus has not been collected on *Erysimum marschalianum* in Europe; on *Erysimum pieninicum* reported only from Poland, on *Fumaria officinalis* only from Switzerland, while on *Lunaria rediviva* known from 11 countries (Braun 1995).

Erysiphe euonymi DC.
= *Microsphaera euonymi* (DC. ex Mérat) Sacc.

Coating mostly on the lower surface of the leaf, distinctive, white, arachnoid. Conidia ellipsoid-cylindrical or cylindrical, 25.5–34 × 13.5–15 μm, solitary. Chasmothecia diam. 86–118 μm, appendages 7–10, 3–5 times dichotomously branched

at the end, 2–5 times longer than chasmotecium diameter. Asci 4–8, 48–62 × 34–38 μm. Ascospores mostly 3–4, 18–25 × 11–14 μm.

Host and locality: On *Euonymus europeaus* var. *alba* Schn.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 05.10.2004, leg. et det. U. Świderska (LBLM 8529).

Remarks. The fungus has not been reported on *Euonymus europeaus* var. *alba* in Poland. It has been frequently collected on *Euonymus europeaus* (Sałata 1985; Danilkiewicz 1987; Mułenko 1988; Sałata et al. 1993; Dynowska et al. 1999; Czerniawska 2001). In Europe known from 19 countries (Braun 1995).

Erysiphe hedwigii (Lév.) U. Braun & S. Takamatsu
= *Microsphaera hedwigii* Lév., *M. viburni* (de Bary) Blumer

The coating on leaves, poorly visible, greyish. Conidia few, ellipsoid or cylindrical-ellipsoid, 25–38 × 12–15 μm, solitary. Chasmothecia on the lower surface of the leaf, diam. 67–75 μm. Appendages 3–5, 4–5 times dichotomously branched at the end, 1–1.5 times longer than chasmothecium diameter. Asci 2–4, 40–45 × 30–35 μm. Ascospores ellipsoid, 17.5–25 × 7.5–12 μm.

Host and locality: On *Viburnum lantana* L.: Wyżyna Lubelska upland, Lublin–LSM, 01.10.2004, leg. et det. M. Kozłowska (LBLM 8549).

Remarks. *Erysiphe* (*Microsphaera*) *hedwigii* has been already reported in Poland on *Viburnum opulus* L., *Viburnum trilobum* Marsh. and *Viburnum lantana* L (Sałata 1985, Madej 1971). The identification of *Viburnum trilobum*, however, was corrected in the successive study by Madej (1974): it is *V. opulus*. The identification of *Viburnum lantana*, collected in Wolica near Dobczyce, was corrected by Sałata (1985): it is *Viburnum opulus*. According to Braun (1995), data on *Viburnum opulus* should be refered to *Erysiphe viburni* Duby (=*Microsphaera sparsa* Howe). The above explanations show that *Erysiphe* (*Microsphaera*) *hedwigii* on *Viburnum lanatana* has not been collected in Poland before.

The fungus has been reported on *Viburnum lantana* L. from 15 countries in Europe, including Poland (Braun 1995), however these findings are probably reported for the locality from Wolica near Dobczyce (see above), where the host was *Viburnum opulus*, on which *Erysiphe viburni* Duby (=*Microsphaera sparsa* Howe) occurs.

Erysiphe heraclei DC.

The fungus infects leaves, covering them with greyish, amphigenous, coating, consisting of the mycelium and few conidiophores and conidia. Conidia cylindrical or cylindrical-ellipsoid, 27–38 × 11–16 μm, most frequently 32–34 × 11–14 μm, formed singly. Chasmothecia on both surfaces of the leaf, globose, dark brown or black, diam. 85.5–107 μm, most frequently 91–99 μm. Appendages shorter or as long as chasmothecium diameter. Asci ellipsoid or ovoid, 63–68 × 36–41 μm, 3(-4)-spored. Ascospores ellipsoid, rarely ovoid, 18–23 × 11–14 μm.

Hosts and localities: On *Heracleum sosnowskyi* Manden.: WYŻYNA LUBELSKA UPLAND, Lublin, Botanical Garden, 14.10.2004, leg. et det M. Mamczarz (LBLM 8510, 8511);

on *Heracleum* sp. (*H. sosnowskyi* Manden. or *H. mantegazzianum* Somm. et Levier): WYŻYNA KIELECKA UPLAND, Świętokrzyski National Park, beginning of the tourist trail to Święty Krzyż Mt., 04.08.2004, leg. et det. M. Mamczarz (LBLM 8512, 8513).

Remarks. *Heracleum sosnowskyi* and *H. mantegazzianum* are related Caucasian species, very similar to each other (Rutkowski 1998). No descriptions of *H. sosnowskyi* are given in Polish literature; however, according to Caucasian flora (Grossgejm 1967), fruits, not collected in the present study, are required for the differentiation of the two species. Thus, a detailed determination of the specimen found in the Świętokrzyski National Park was not possible and the plant must be collected again.

The fungus occurs commonly in Poland and has been reported on 33 plant species. Sałata (1985) listed 29 host plants for this species and 4 have been added: *Aethusa cynapium* L. (Dynowska et al. 1999), *Chaerophyllum aureum* L. (Wołczańska and Oklejewicz 2001), *Chaerophyllum temulum* (Mułenko 1988; Dynowska et al. 1999; Czerniawska et al. 2000; Adamska 2001), *Oenanthe aquatica* (L.) Poir. (Romaszewska-Sałata et al. 1986; Mułenko 1988). However, it is known only from 4 localities on *H. mantegazzianum* (Przelewice near Pyrzyce, Dzierżoniów, Ożarów Mazowiecki, Lublin), while it has not been noted so far on *H. sosnowskyi* (Sałata 1985).

The fungus has not been reported on *Heracleum sosnowskyi* in Europe either. It is known on *H. mantegazzianum* from 8 countries (Braun 1995).

Erysiphe tortillis (Wallr.) ex Fr.

Coating distinctive, arachnoid, farinose, usually on the lower surface of the leaf. Conidia ellipsoid or cylindrical-ellipsoid, 28–35 × 10–15 μm, formed singly (pseudoidium type). Chasmothecia gregarious or solitary on the lower surface of the leaf, diam. 94-108 μm. Appendages 12–19, unbranched or branched dichotomously 1–5 times [acc. to Braun (1995) mature appendages may branch twice at the most]. Asci usually 3–5, 47–67 × 32–42 μm. Ascospores 3–5, ellipsoid, 19–28 × 9.5–14 μm.

Host and locality: On *Cornus stolonifera* Michx. 'Flaviramea': WYŻYNA LUBELSKA UPLAND, Lublin, Botanical Garden, 26.07.2000, leg. W. Mułenko, det. U. Świderska (LBLM 8539).

Remarks. The fungus has not been reported on *Cornus stolonifera* 'Flaviramea' in Poland before, and collected only in Przelewice near Pyrzyce on *C. stolonifera* Michx. (Madej 1971, Sałata 1985). Also known from one locality (n. Strzelno) on *C. alba* L. and from numerous localities on *C. sanguinea* L. (Romaszewska-Sałata and Mułenko 1983, Sałata 1985, Danilkiewicz 1987, Mułenko 1988, Czerniawska 2001).

It has not been reported on *Cornus stolonifera* 'Flaviramea' in Europe either, while on *Cornus stolonifera* known only from Poland (Braun 1995).

Erysiphe vanbruntiana* var. *sambuci racemosae (U. Braun) U. Braun & S. Takamatsu
= *Microsphaera vanbruntiana* var. *sambuci racemosae* U. Braun

Conidiophores and conidia were not observed. Chasmothecia on both surfaces of the leaf, scattered or gregarious, dark brown, diam. 128–144 μm. Appendages 20–27 without transverse septa, 2–5(-6) times dichotomously branched at the ends, 1–1.5 times longer than chasmothecium diameter. Asci were not observed.

Host and locality: On *Sambucus nigra* L. var. *laciniata* (L.) Zabel: Wyżyna Lubelska upland, Lublin, Botanical Garden, 26.07.2000, leg. W. Mułenko, det. U. Świderska (LBLM 8540).

Remarks. The fungus has not been reported on *Sambucus nigra* var. *laciniata* in Poland before. Noted on *Sambucus nigra* L. only from 3 localities (Ruszkiewicz 2000; Czerniawska et al. 2000); it occurs, however, commonly on *Sambucus racemosa* L. (Sałata 1985, Romaszewska-Sałata et al. 1986, Danilkiewicz 1987, Mułenko 1988, Sałata et al. 1993, Mułenko et al. 1995, Adamska et al. 1999, Dynowska et al. 1999, Czerniawska et al. 2000, Adamska 2001).

It has not been reported on *S. nigra* var. *laciniata* in Europe either. Reported on *Sambucus nigra* in Germany, France, Italy and Romania (Braun 1995).

Golovinomyces biocellatus (Ehrenb.) V. P. Gelyuta
= *Erysiphe biocellata* Ehrenb.

The fungus was collected only in the conidial stage. Delicate, whitish, arachnoid coating occurrs on leaves and stems. It consists of the mycelium, conidiophores and conidia. Conidiophores 48–50 × 10–13 μm. Conidia ellipsoid or cylindrical, 28–33 × 14–17 μm, formed in chains.

Hosts and localities: On *Ajuga chamaepitys* (L.) Schreb.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 28.09.2004, leg. et det. A. Wołczańska (LBLM 8550);

on *Monarda didyma* L.: Pobrzeże Gdańskie littoral region, Władysławowo, flower-bed, 26.07.1999, leg. W. Mułenko, det. U. Świderska (LBLM 8525);

on *Monarda fistulosa* L.: Pobrzeże Gdańskie littoral region, Władysławowo, flower-bed, 26.07.1999, leg. W. Mułenko, det. U. Świderska (LBLM 8526).

Remarks. *Golovinomyces biocellatus* is a frequent species in Poland, noted on 17 plant species so far. Sałata (1985) listed 15 host plants for this species and 2 have been added: *Mentha* x *citrata* Ehrh. subsp. *citrata* (Adamska 2001) and *Monarda hybrida* Wender (Adamska 2002). The fungus has not been recorded on *Ajuga chamaepitys* and *Monarda fistulosa*, while it has been known only on *M. didyma* from the Botanical Garden in Lublin (Sałata 1985).

The fungus has not been reported in Europe on *Monarda fistulosa*, on *Ajuga chamaepitys* known only from Romania, while on *Monarda didyma* from 6 countries (Braun 1995).

Golovinomyces cichoracearum (DC.) V. P. Gelyuta **var. *cichoracearum***
= *Erysiphe cichoracearum* DC.var. *cichoracearum*

Coating on both surfaces of the leaf, arachnoid, delicate. Conidia cylindrical or cylindrical-ellipsoid, 25–29 × 12–15 μm. Chasmothecia diam. 100-140 μm. Asci 5–6, 50–60 × 32.5–37.5 μm. Ascospores 2 (less frequently 4) 22.5–25 × 12.5–15 μm.

Hosts and localities: On *Inula macrocephala* Boiss. & Kotschy ex Boiss.: Wyżyna Lubelska upland, Lublin, Botanical Garden, 28.09.2004, leg. et det. A. Wołczańska (LBLM 8548);

on *Hieracium umbellatum* L.: Pobrzeże Gdańskie littoral region, Hel Peninsula, Jastarnia, on the side of Zatoka Pucka, 04.09.1999, leg. et det. A. Wołczańska (LBLM 8518);

on *Senecio macrophyllus* M. Bieb.: Polesie Wołyńskie, Brzeźno reserve, 18.08.2004, leg. B. Czarnecka and K. Kowalska, det. A. Wołczańska (LBLM 8546, 8547).

Remarks. The fungus has not been noted on *Inula macrocephala* and *Senecio macrophyllus* in Poland before; while on *Hieracium umbellatum* reported only from the vicinity of Świnoujście and Władysławowo (Sałata 1985).

Senecio macrophyllus was not differentiated earlier as a separate species but included in *Senecio umbrosus* Waldst. & Kit. sensu lato (Mirek et al. 2002). Its range in Poland is limited only to the Lublin region (Zając and Zając 2001). *Senecio macrophyllus* is not listed as a host of *Erysiphe cichoracearum* var. *cichoracearum* in the European monograph by Braun (1995) either. Only *Senecio umbrosus*, on which the parasite was collected in former Czechoslovakia, Romania and the former Soviet Union, is listed. The fungus has not been collected on *Inula macrocephala* in Europe either, while it has been noted on *Hieracium umbellatum* in 11 countries (Braun 1995).

Golovinomyces cichoracearum* var. *latisporus (U. Braun) U. Braun
= *Erysiphe cichoracearum* var. *latispora* U. Braun

Infection visible as distinctive, whitish, arachnoid or farinosus coating, covering stems and both surfaces of the leaf. Conidia cylindrical-ellipsoid or cylindrical; 28–34 × 15–18 μm, formed in chains. Chasmothecia diam. 100–165 μm. Asci were not developed.

Host and localities: On *Helianthus annuus* L.: Kotlina Sandomierska basin, Biłgoraj, allotment plot, 20.08.1997 (conidial stage), leg. W. Mułenko, det. U. Świderska (LBLM 8541); Wyżyna Lubelska upland, Lublin, Botanical Garden, 13.10.2004 (teleomorphic stage), leg. et det. M. Kozłowska (LBLM 8517).

Remarks. On *Helianthus annuus* fungus was colleted only in Kraków (Piątek 2004a).

It occurs on this host in 11 countries in Europe (Braun 1995).

Golovinomyces orontii (Cast.) V. P. Gelyuta
=*Erysiphe orontii* Cast.

The fungus infects primarily leaves, as well as stems, covering them with a arachnoid coating. Conidia ellipsoid-ovoid or subcylindric, 27–38 × 15–18 μm, formed in chains.

Host and localities: On *Vinca minor* L.: KOTLINA SANDOMIERSKA BASIN, Sandomierz, cemetery, 13.11.2001, 18.09.2002, 13.11.2002 (LBLM 8536-8538), Sandomierz-Podgórze, garden, 02.11.2002, Sandomierz-Czarne, garden 18.09.2002 (LBLM 8530-8534), leg. et det W. Mułenko.

Remarks. The fungus has not been reported on *Vinca minor* in Poland. It has been reported on this host in Europe only from 4 countries: France, Italy, the former Soviet Union and Switzerland (Braun 1995).

Golovinomyces sordidus (Junell) V. P. Gelyuta
=*Erysiphe sordida* Junell

Coating on both surfaces of the leaf, greyish, poorly visible. Conidia ellipsoid or cylindrical-ellipsoid, 25–32.5 × 12.5–16.5 μm, formed in chains. Chasmothecia few, diam. 120–140 μm. Asci 5–7, 50–62.5 × 27–32.5 μm. Ascospores ellipsoid, 18–25 × 12.5–15 μm.

Host and locality: On *Plantago intermedia* Gilib.: POGÓRZE ŚRODKOWOBESKIDZKIE FOOTHILL, Rymanów, waste places, 21.09.1994, leg. et det. A. Wołczańska (LBLM 8516).

Remarks. The fungus is known on *Plantago intermedia* in Poland from 4 localities: Przęsławice and Secymin Nowy in the Kampinowska Forest (Sałata 1985) as well as in the Parkowe reserve, and the Olsztyn reserve near Częstochowa (Ruszkiewicz 2000). On other species (*P. major* L., P. *media* L., *P. lanceolata* L.) noted fairly frequently (Romaszewska-Sałata and Mułenko 1983, Sałata 1985; Danilkiewicz 1987, Mułenko 1988, Sałata et al. 1993, Dynowska et al. 1999, Czerniawska et al. 2000, Adamska 2001, Czerniawska 2001).

It has been noted on *Plantago intermedia* only in 4 countries in Europe: former Czechoslovakia, Hungary, Poland and Finland (Braun 1995).

Neoerysiphe galii (S. Blumer) U. Braun
= *Erysiphe galii* S. Blumer

Coating whitish, delicate, poorly visible, amphigenous. Conidia cylindrical or cylindrical-ellipsoid, 11–16 × 25–32 μm, formed in chains. Chasmothecia not found.

Host and locality: On *Cruciata glabra* (L.) Ehrend.: POGÓRZE ŚRODKOWOBESKIDZKIE FOOTHILL, Rymanów, insolated slope, 16.09.1993, leg. et det. A. Wołczańska (LBLM 8519).

Remarks. The fungus was collected on *Cruciata glabra* only in the Sokola Góra reserve near Częstochowa (Ruszkiewicz 2000). Additionally it is known on 8 other plant species: 7 reported Sałata (1985), and 1 (*Galium palustre* L.) Romaszewska-Sałata et al. (1986) and Mułenko (1988).

In Europe it has been noted on *Cruciata glabra* in Austria, Romania and former Soviet Union (Braun 1995).

Podosphaera tridactyla (Wallr.) de Bary **var. *tridactyla***

Conidiophores and conidia was not observed on infected organs. Chasmothecia 80–95 μm, scattered or gregarious on both surfaces of the leaf. Appendages 2–4 (most frequently 3–4) times dichotomously branched. Asci broadly ellipsoid or almost globose, 68–85 × 58–63 μm. Ascospores 8 ellipsoid or broadly ellipsoid, 22–26.5 × 14–15.5 μm.

Host and locality:

on *Cerasus avium* (L.) Moench: Wyżyna Lubelska upland, Lublin, Botanical Garden, 26.07.2000, leg. W. Mułenko, det. U. Świderska (LBLM 8542).

Remarks. The fungus occurs rarely on *Cerasus avium* in Poland and has so far been reported only from Kraków and Mszana Dolna (Sałata 1985) as well as from Pojezierze Łęczyńsko-Włodawskie lake district (Mułenko 1988). From Poland is known 8 host plants of this fungus. Sałata (1985) listed 7 hosts for this species and 1 [*Padus serotina* (Ehrh.) Borkh.] was noted by Ruszkiewicz (2000) and Ruszkiewicz-Michalska and Mułenko (2003).

It has been reported on this host in 10 countries in Europe (Braun 1995).

Sawadaea tulasnei (Fuck.) Homma
= *Uncinula tulasnei* (Fuck.) Homma

Coating arachnoid, whitish, especially on the upper surface of infected leaves. Conidia ellipsoid, ovoid or almost globose, 22.5–28 × 14–17.5 μm, formed in chains. Chasmothecia dark brown or almost black, diam. (128-)136–160 μm. Appendages numerous (28-)42–85, hyaline, without transverse septa, usually unbranched, circinate at the ends, shorter than chasmothecium diameter. Asci 8–10, subsessile, 53–67 × 31–39 μm. Ascospores 8, ellipsoid or ellipsoid-ovoid, 18–21 × 10–11 μm.

Host and locality: on *Acer ginnala* Maxim.: Sudety Środkowe Mts, Polanica Zdrój, 20.09.2001 (conidial stage); Wyżyna Lubelska upland, Lublin–Czechów, 18.10.2003 (conidial and teleomorphic stages), leg. W. Mułenko, det. U. Świderska (revised by U. Braun, Germany) (LBLM 8543-8545).

Remarks. The fungus has not been reported on *Acer ginnala* in Poland before. However, it frequently occurs on *Acer platanoides* L., and lately was also collected on *Acer tataricum* L. (Piątek 2004a).

It has been reported on *Acer ginnala* in Europe only from the former Soviet Union and Ukraine (Braun 1995).

Oidium carpini Fotzik

White coating on the upper leaf surface, delicate, arachnoid, poorly visible. Hyphae septate, branched up to 6 μm wide, appressoria lobed, solitary or in opposite pairs. Conidiophores erect, 25–50 μm long. Conidia ellipsoid-cylindric, 25–35 × 10–15 μm, solitary, rarely in short chains (2–3 conidia).

Host and locality: On *Carpinus betulus* L.: NIZINA PÓŁNOCNOPODLASKA LOWLAND, Białowieża National Park, Forest Compartment 342, Permanent plot No 40 of Białowieża Geobotanical Station of Warsaw University, *Tilio-Carpinetum*, 27.09.1992, leg. W. Mułenko, det. M. Kozłowska (LBLM 8466, 8467).

Remarks. The fungus was collected on *Carpinus betulus* L. only in Kraków and Tarnów (Piątek 2004b).

It has been noted on this host only in 3 countries in Europe: Germany, Great Britain (Braun 1995) and Hungary (Szabó 2003).

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Interesujące gatunki mączniakowych (Erysiphales) zebrane w Polsce

Streszczenie

W ciągu ostatnich kilku lat zebrano w Polsce 17 interesujących gatunków grzybów mączniakowych (Erysiphales) na 37 taksonach (gatunkach, odmianach) roślin naczyniowych. W pracy przedstawiono krótką charakterystykę tych grzybów oraz podano informacje o ich rozmieszczeniu w Polsce i w Europie. Osiem gatunków pasożytów znaleziono na 13 nowych (dla grzybów) roślinach żywicielskich. Należą do nich: *Erysiphe berberidis* (na *Berberis amurensis* var. *japonica*, *B.* x *chopinii* 'Mazurek', *B. lycioides*, *B.* x *ottawensis* 'Purpurea', *B. vulgaris* 'Atropurpurea' i *B. wilsoniae* var. *subcaulialata*), *Erysiphe cruciferarum* (na *Erysimum marschalianum*), *Erysiphe euonymi* (na *Euonymus europeaus* var. *alba*), *Erysiphe heraclei* (na *Heracleum sosnowskyi*), *Erysiphe tortilis* (na *Cornus stolonifera* 'Flaviramea'), *Erysiphe vanbruntiana* var. *sambuci racemosae* (na *Sambucus nigra* var. *laciniata*), *Golovinomyces biocellatus* (na *Monarda fistulosa*) i *Golovinomyces cichoracearum* var. *cichoracearum* (na *Inula macrocephala*). Nowymi żywicielami dla grzybów mączniakowych w Polsce okazały się 24 gatunki roślin. Największa liczba roślin (10 gatunków) zainfekowana była przez *Erysiphe berberidis* DC.