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## New records of Erysiphales and Uredinales from Poland

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*Puccinia mei-mamillata* Semad. was found for the first time in Poland on *Angelica sylvestris* L., *Neoerysiphe galeopsidis* (DC.) U. Braun on *Melittis melisophyllum* L. and *Podosphaera xanthii* (Castagne) U. Braun & N. Shishkoff on *Physalis alkekengi* L. The new collections are described, illustrated and discussed herein. The key to the aecial state of rust fungi on *Angelica* in Poland is provided. Another four species are known from few localities on their hosts in Poland.

**Key words:** rust fungi, powdery mildews, distribution

### INTRODUCTION

In the last few years there have been an increase in the number of reports on the occurrence of new species of fungi in Poland as well as on the extending range of native species and their invasion onto new hosts. This especially relates to powdery mildew (Erysiphales), but there are also data on Uredinales, Ustilaginomycetes and anamorphic fungi (e.g. Adamska 2001, 2005; Piątek 2003a,b, 2005; Piątek, Wołczańska 2004; Ruszkiewicz-Michalska 2006; Ruszkiewicz-Michalska, Michalski 2005; Wołczańska 2007; Wołczańska, Oklejewicz 2001; Wołczańska, Lamorski 2006; Wołczańska, Rozwałka 2005). This phenomenon may stem from natural migration of fungi or the introduction thereof into new areas, from migration of hosts and climatic changes, favorably enabling phytopathogens to develop fully. The present paper adds other plants to the list of hosts of phytopathogenic fungi in Poland and provides new data to their distribution. Detailed descriptions and illustrations are given for the species observed on new hosts: *Puccinia mei-mamillata* Semad. on *Angelica sylvestris*, *Neoerysiphe galeopsidis* (DC.) U. Braun on *Melittis melisophyllum* and *Podosphaera xanthii* (Castagne) U. Braun & N. Shishkoff on *Physalis alkekengi*.

All the collected specimens have been deposited in the Mycological Herbarium of the Department of Botany and Mycology, University of Maria Curie-Skłodowska in Lublin (LBL M). The taxonomy and nomenclature of Uredinales are based on the

monograph by Majewski (1977, 1979), and powdery mildews on the monograph and papers by Braun (1987, 1995, 1999) and Braun & Takamatsu (2000). The names of plants are taken after Mirek et al. (2002).

## LIST OF SPECIES

### ERYSIPHALES

*Neoerysiphe galeopsidis* (DC.) U. Braun [= *Erysiphe galeopsidis* DC.]

White, dense, persistent *mycelium* on the leaves. *Appressoria* lobed. *Conidia* ellipsoid-ovoid: 30-38(40) x 12-18  $\mu\text{m}$ , produced in chains (Fig. 1A, B).

SPECIMEN EXAMINED: on *Melittis melisophyllum*: Roztocze National Park, Maziarki reserve, 25.06.1998, LBL M-8650.

REMARKS. This species was collected in Poland on 32 host plants. In Europe it was noted on *Melittis melisophyllum* in Austria, France, Switzerland and Montenegro (Braun 1995; Farr et al. [n.d.]).

*Phyllactinia mali* (Duby) U. Braun

SPECIMEN EXAMINED: on *Crataegus* sp. (cult): Wyżyna Lubelska Upland, Lublin, road side, 5.11.2004, LBL M-8649.

REMARKS. In Poland this species was recorded on this host in Opole and Pruszków (Sałata 1985).

*Podosphaera xanthii* (Castagne) U. Braun & N. Shishkoff [= *Sphaerotheca xanthii* (Cast.) L. Junell]

White amphigenous *mycelium* on the leaves, *appressoria* indistinct, sometimes slightly nipple-shaped. *Conidia* ellipsoid-ovoid: 25-27.5 x 15-17.5  $\mu\text{m}$  produced in chains. The *ascocarps* grouped; they occurred on both sides of leaves and measured 87-115 (-125)  $\mu\text{m}$  in diameter. The *appendages* on the lower part of ascocarp; they were septate and brown - the longest ones were subhyaline at the end. In the chasmothecium one sessile *ascus*: 60-70 x 50-60  $\mu\text{m}$ . The *oculus* (apical thin-walled part of *ascus*) large, measured 15-20  $\mu\text{m}$  in diameter (Fig. 2A). *Ascospores* broadly ellipsoid: 13,5-17,5 x 10-14  $\mu\text{m}$ .

SPECIMENS EXAMINED: on *Physalis alkekengi*: Western Carpathians, Pogórze Środkowobeskidzkie foothills, Rymanów, garden, cultivated, 9.09.2002, LBL M-8651; Wyżyna Lubelska Upland, Lublin, garden, cultivated, 19.09.2003, 21.09.2003, 22.10.2003, LBL M-10049-10051;

REMARKS. *Sphaerotheca fusca* (Fr.) Blumer sensu Braun (1987, 1995) was divided into two species: *Podosphaera xanthii* (Castagne) U. Braun & N. Shishkoff and *Podosphaera fusca* (Fr.) U. Braun & N. Shishkoff due to the diameter of *oculus* and the size of *ascmata* (Braun, Takamatsu 2000). The Polish collections on *Physalis alkekengi* belong to *Podosphaera xanthii* – the *oculi* (thin, apical parts of *asci*) are large and measured 15-20  $\mu\text{m}$  (Fig. 2A). For comparison was used specimen published by Wołczańska and Oklejewicz (2001) as *Sphaerotheca fusca* (Fr.) Blumer (= *Podosphaera fusca* (Fr.) U. Braun & N. Shishkoff) on *Doronicum austriacum* Jacq., Beskid Niski Mts., Jasiel, 31.07.1991, LBL M-7126. The *oculi* of *asci* of this species measure 10-12  $\mu\text{m}$  and are distinctly smaller than those of *Podosphaera xanthii* (Fig. 2B).

In connection to the diagnosis proposed by Braun and Takamatsu (2000) other specimens reported as *Sphaerotheca fusca* sensu Braun (1987, 1995) require revision. In the mycological literature there is only little information about the occurrence of *Podospaera xanthii* on *Physalis* spp. It was recorded under this name only in Taiwan (Cheng et al. 2006) and as *Sphaerotheca xanthii* from Bulgaria (Farr et al. [n.d.]).

## UREDINALES

### *Aecidium clematidis* DC.

**SPECIMEN EXAMINED:** on *Clematis* sp. (cult.): Western Carpathians, Pogórze Środkowobeskidzkie foothills, Rymanów, garden, 24.06.2006, LBL M-8648.

**REMARKS.** In Poland this species was recorded only on *Clematis recta* in Kazimierz Dolny, Puławy (Majewski 1977) and in Kazimierski Landscape Park (Romaszewska-Sałata et al. 1991-1992).

### *Puccinia mei-mamillata* Semad.

**Pycnia:** hypogenous on leaves, scattered between aecia, diameter 80 µm. **Aecia:** *Aecidium* - type, as longitudinal or roundish, orange groups up to 6 mm, on leaf petioles and hypogenous on leaves along the nerves. The outer wall of peridium cells distinctly thicker [8-12 µm] than the inner wall [3-6(8) µm]. **Aeciospores** angular globoid, 16 x 20 µm, delicately verrucosus with distinct clots, spore wall hyaline 0.5-1 µm (Fig. 1 C).

**SPECIMEN EXAMINED:** on *Angelica sylvestris*: Western Carpathians, Pogórze Środkowobeskidzkie foothills, Rymanów, meadow, 21.05.1992, LBL M-8584.

**REMARKS.** *Puccinia mei-mamillata* is a heteroaeccious species. So far in Poland aecia of this fungus have been collected only on *Mutellina purpurea* (Poir.) Thell. on Śnieżnik Mt (Sudety Mts) and on Babia Góra Mt (Beskid Żywiecki Mts) (Majewski 1979) and lately also in the Tatra Mountains (Wolczańska, Piątek 2008, mscr.). Urediniospores and teliospores occur on *Polygonum bistorta* L. in the south and in the middle part of Poland (Majewski 1979) and on *Polygonum viviparum* L. in the Tatra National Park (Beskid) (Sałata et al. 1984). On *Angelica sylvestris* this species has not been collected in Poland so far. It was recorded on this host in the Czech Republic, Lithuania, Norway, Germany, Russia and Sweden (Farr et al. [n.d.]).

In Poland aecia of the following agents of rust fungi can occur on *Angelica* species (Majewski 1979): *Puccinia bistortae* DC., *Puccinia polygoni-vivipari* Karst., *Puccinia pimpinellae* (Str.) Röhl. and *Puccinia mei-mamillata*. The aeciospores of *Puccinia mei-mamillata* are the smallest and have big, seceding clots. Important differences are also visible in the thickness of peridium cells. *P. mei-mamillata* has different proportion between the outer and inner peridium walls than *Puccinia pimpinellae* and the thickness of peridium cell walls of the other species is distinctly smaller (Tab.1).

### Key to the aecial state of rust fungi on *Angelica* ssp. in Poland

1. Aeciospores with distinct, big, seceding clots ..... *Puccinia mei-mamillata*
- 1\* Aeciospores without clots ..... 2
2. The inner wall of peridium cells thicker than the outer wall .. *Puccinia pimpinellae*
- 2\* The inner wall of peridium cells thinner than the outer wall ..... 3
3. Aeciospores big, 20-32 x 14-21 µm; the spore wall 2-3 µm ..... *Puccinia bistortae*
- 3\* Aeciospores smaller, diameter 18-25 µm; the spore wall 3-4 µm .....  
..... *Puccinia polygoni-vivipari*

Table 1  
Comparison of aecia of rust fungi occurring on *Angelica* spp. in Poland

Species	Aeciospores		Peridium	
	dimensions	occurrence of clots	outer cell	inner cell
<i>Puccinia bistortae</i> *	20-32x14-21 $\mu\text{m}$	–	3-3,5 $\mu\text{m}$	2-3 $\mu\text{m}$
<i>Puccinia polygoni-vivipari</i> *	$\varnothing$ 18-28 $\mu\text{m}$	–	to 5 $\mu\text{m}$	thinner than the outer wall
<i>Puccinia pimpinellae</i> *	$\varnothing$ 18-25 $\mu\text{m}$	–	4-5 $\mu\text{m}$	4-8 $\mu\text{m}$
<i>Puccinia meimamillata</i>	$\varnothing$ 16-20 $\mu\text{m}$	+	8-12 $\mu\text{m}$	3-6(-8) $\mu\text{m}$

\* data after Majewski (1979)

### *Puccinia sessilis* Schneid.

SPECIMEN EXAMINED: on *Platanthera bifolia* (L.) Rich.: Roztocze, Roztocze National Park, Maziarki reserve, beech forest, 25.06.1998, LBL M-8647.

REMARKS. In Poland this species was recorded on this host only in Lipiny near Lubin (Majewski 1979).

### *Uromyces ononidis* Pass.

SPECIMEN EXAMINED: on *Ononis arvensis* L.: Western Carpathians, Pogórze Środkowobeskidzkie foothills, Rymanów, waste land, 21.09.1994, LBL M-8646.

REMARKS. In Poland this species was recorded on this host near Międzyrzec Podlaski (Majewski 1977) and in Rymanów (Wolczańska 1994).

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## Nowe informacje o grzybach fitopatogenicznych w Polsce

### Streszczenie

W pracy przedstawiono nowe stanowiska dla siedmiu gatunków grzybów fitopatogenicznych. Trzy z nich znaleziono na roślinach żywicielskich, na których nie były dotąd notowane w Polsce: *Puccinia mei-mamillata* (na *Angelica sylvestris*), *Neoerysiphe galeopsidis* (na *Melittis melisophyllum*) i *Podosphaera xanthi* (na *Physalis alkekengi*). Podano dla nich opisy i ilustracje, a dla grzybów rdzawnikowych tworzących ecja na przedstawicielach rodzaju *Angelica* przygotowano klucz do ich oznaczania. Pozostałe gatunki na podanych żywicielach znane są z wielu stanowisk w Polsce.

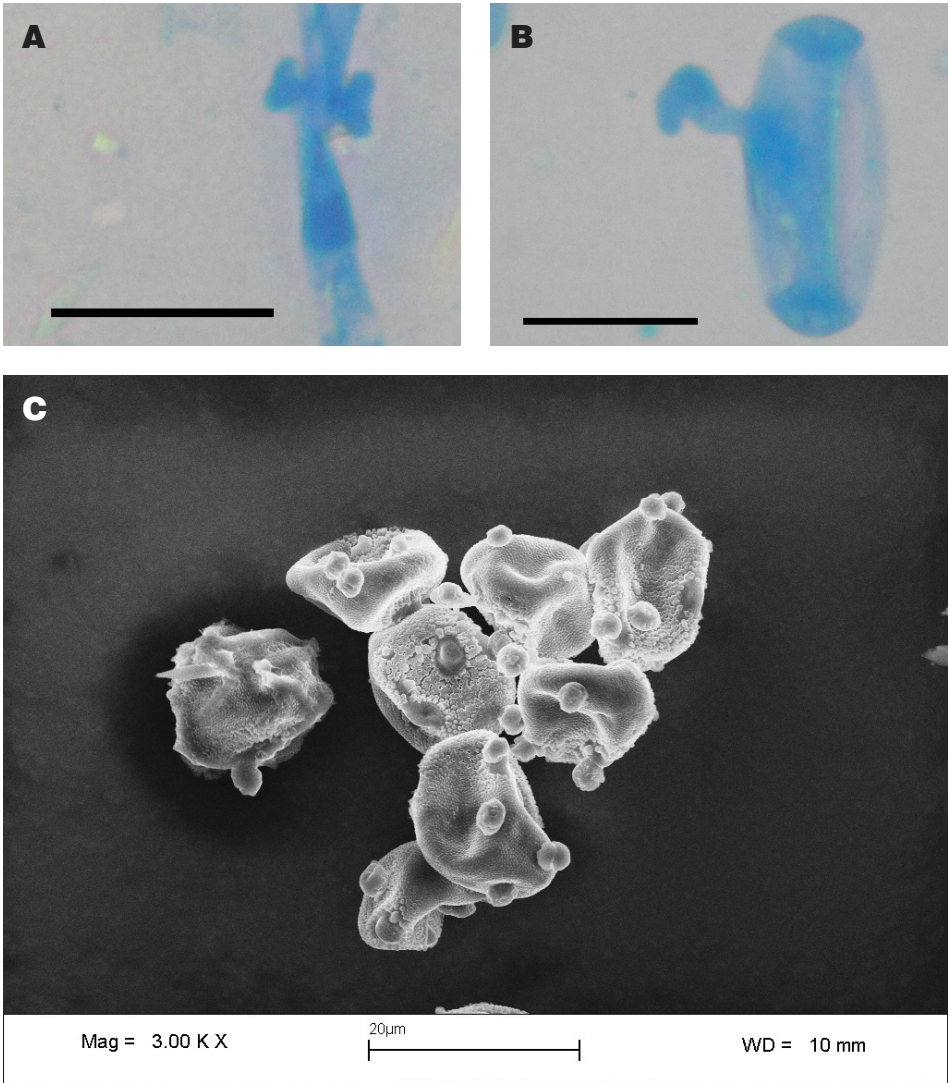


Fig. 1. A – lobed appressoria of *Neoerysiphe galeopsidis*; B – germinating conidium of *Neoerysiphe galeopsidis*; C – aeciospores of *Puccinia mei-mamillata* on *Angelica sylvestris*, scale bar = 20 μm.

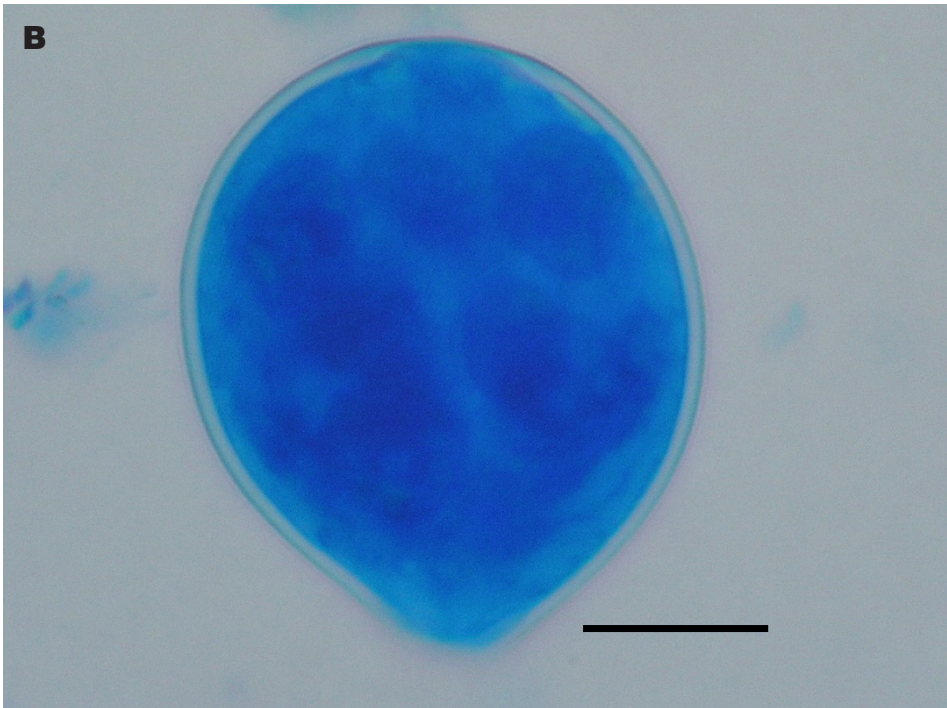
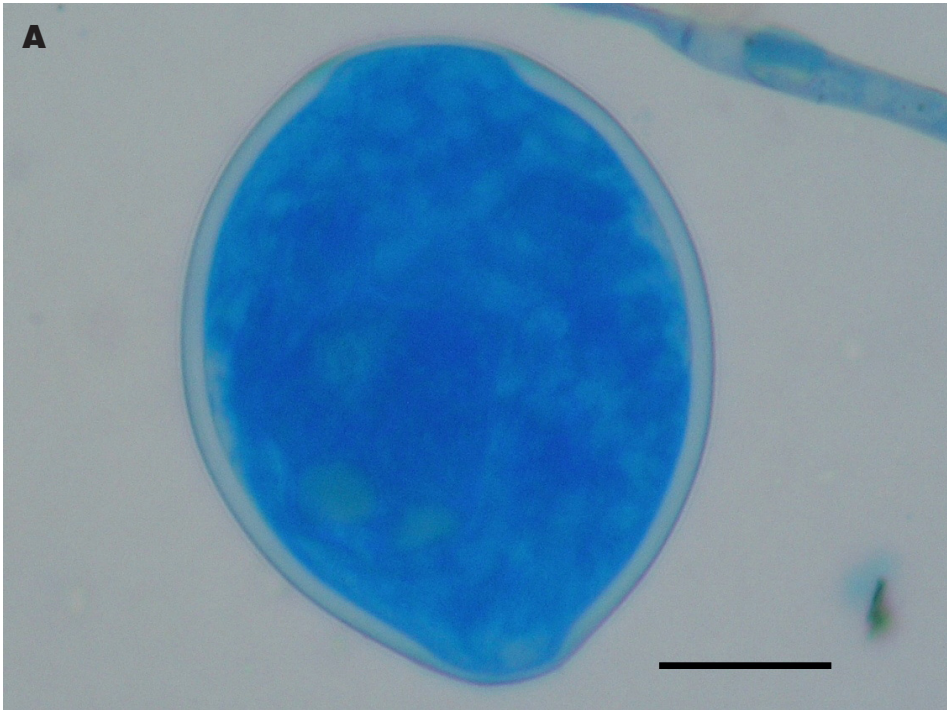


Fig. 2. A – ascus of *Podosphaera xanthii*; B – ascus of *Podosphaera fusca*, scale bar = 20  $\mu\text{m}$ .