

Some interesting species of the genus *Ascochyta*

EWA POŁEĆ and MAŁGORZATA RUSZKIEWICZ-MICHALSKA

Department of Mycology, University of Łódź, Banacha 12/16
PL-90-237 Łódź, ewa_polec@op.pl

Połeć E., Ruszkiewicz-Michalska M.: *Some interesting species of the genus Ascochyta*. Acta Mycol. 46 (2): 187–200, 2011.

The paper presents eleven species of *Ascochyta* recently collected in central and southern part of Poland. Two of them, *Ascochyta bondarceviana* Melnik and *Ascochyta equiseti* (Desm.) Grove noted in Poland for the first time, are illustrated with microphotographs. In addition, nine other species are newly reported on their host plants species in the country. Short characteristics of the fungi species based on the collected specimens and the distribution maps of all fungi taxa are presented.

Key words: micromycetes, anamorphic fungi, *Phoma*, coelomycetes, plant parasites, Poland

INTRODUCTION

The genus *Ascochyta*, one of the largest (over 1 400 names) and the most important genera of anamorphic fungi, was often examined since its description by Libert in 1830. As a result, many species were reallocated to other genera at the beginning of 20th century, and some of them (e.g., *Ascochyrella* Tassi and *Ascochyula* Died.) were later re-synonymized with *Ascochyta* (Buchanan 1987). The great interest in this genus stems from the fact that its members are the parasites of numerous cultivated and wild plants, causing diseases of economically important taxa (Melnik 2000).

Ascochyta anamorphs are characterized by unilocular, glabrous, ostiolate, pycnidial conidiomata and usually uniseptate, hyaline to pale-coloured conidia. The known teleomorphs are placed mainly in *Didymella* Sacc. (Pleosporales) (Kirk et al. 2008), and according to Melnik (2000) and Index Fungorum (www.indexfungorum.org) some *Ascochyta* species are also linked to two other ascomycetous genera, namely *Leptosphaeria* Ces. & De Not. (Pleosporales) and *Mycosphaerella* Johanson (Capnodiales).

The genus *Ascochyta* was the subject of the monographic studies worldwide (Punithalingam 1979, 1988; Melnik 2000). The 72 species recorded in Poland were examined by Sałata (2002) and 60 other species included in his monograph were

known from the neighbouring countries, and were thus expected to occur also in Poland. Due to new findings (Chlebicki 2002; Mułenko, Wojdyło 2002; Kowalski 2004; Piątek, Wołczańska 2004; Kozłowska, Mułenko 2005; Ruszkiewicz-Michalska 2006; Wołczańska 2010) and the comprehensive literature survey (Mułenko, Kozłowska 2008), 60 other species have been reported from our country during the next 10 years. In total, 132 species of this genus are currently known to occur in Poland, some of which were predicted by Sałata (2002), e.g., *A. aristolochiae* Sacc., *A. translucens* Kabát & Bubák and *A. urticae* A.L. Sm. & Ramsb.

MATERIAL AND METHODS

The analysed material has been collected mostly as a result of the systematic studies of plant parasitic micromycetes carried out in urbicoenoses of the Łódź city (Połec 2010). The fresh specimens mounted in Lactophenol Picric acid Solution (Fluka) were examined using the microscopes Nikon Eclipse E200 and Nikon Eclipse 50i; measurements of the morphological structures were made also in tap water. Microphotographs of morphological structures of the species new for Polish mycobiota were taken with a Nikon DS-F1 digital camera.

The base for identification of host plants and fungi were the keys by Szafer, Kulczyński and Pawłowski (1986) and Rutkowski (2004), and taxonomic monographs by Melnik (2000) and Sałata (2002), respectively. The nomenclature of fungi taxa is given after Mułenko and Kozłowska (2008) while the nomenclature of hosts follows checklist by Mirek et al. (2002).

Available literature data were analysed and the distribution maps of all the species listed were prepared. The vouchers representing current collections are deposited in the Herbarium Universitatis Lodziensis (LOD) in the series of *parasitic fungi* labeled as PF.

RESULTS

As a result of the studies, eleven interesting species of the genus *Ascochyta* were identified, including two taxa new for Polish mycobiota, namely *Ascochyta bondarceviana* Melnik (on *Ribes* sp.) and *A. equiseti* (Desm.) Grove (on *Equisetum arvense* L.), both belonging to the subgenus *Ascochyta*. Nine other species are noted for the first time on host plant in Poland: *Ascochyta daturae* Sacc., *A. doronici* Allesch., *A. euphrasiae* Oudem., *A. infuscans* Ellis & Everh., *A. lamiorum* Sacc., *A. leonuri* Ellis & Dearn., *A. sodalis* Naumov, *A. sonchi* (Sacc.) Grove and *A. verbascina* Thüm. These are classified by Melnik (2000) in the *Ascochyta* subgenus *Libertia* Melnik, characterized by consistently single, central or sometimes displaced septum. The majority of the hosts are wild plants, three species are cultivated and one, *Galinsoga parviflora* Cav., is an alien and expansive element in European flora (DAISIE).

DESCRIPTION OF THE SPECIES

Ascochyta bondarceviana Melnik

Leaf spots circular, mostly isolated and visibly separated, mostly 2.0-4.0 mm wide, pale yellow. Pycnidia pale brown, scattered, immersed, lentiform, 125.0-147.5 x 132.5-155.0 μm , with a circular pore, 25.0 μm in diam., surrounded by small dark cells. Conidia cylindrical or ellipsoidal, both ends rounded, straight or slightly flexuous, 0-2-septate, 10.0-12.5 x 5.0 μm . (Fig. 1A, B). Morphological features of the specimens generally correspond to those described by Melnik (2000).

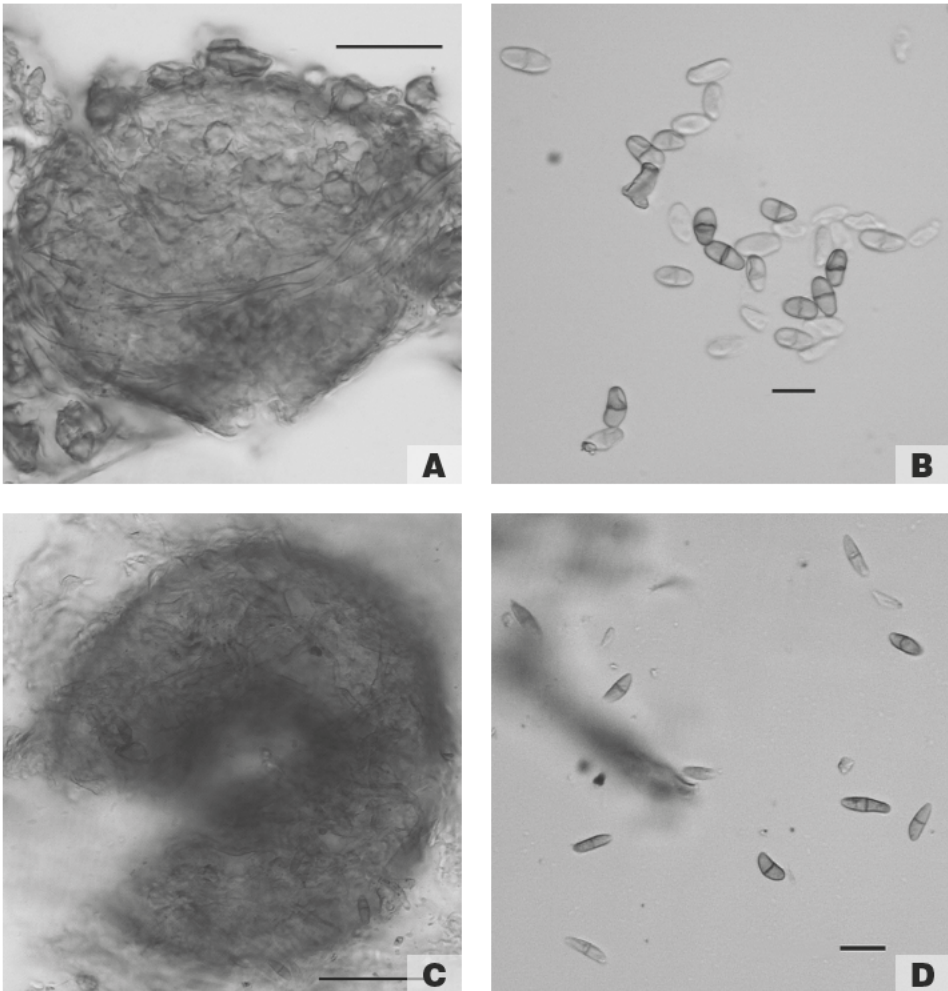


Fig. 1. *Ascochyta* species new to Polish mycobiota. A, B – *Ascochyta bondarceviana* (A – pycnidium, B – conidia mounted in lactophenol picric acid solution); C, D – *Ascochyta equiseti* (C – pycnidium, D – conidia mounted in lactophenol picric acid solution).

Scale bars: A, C = 25 μm ; B, D = 10 μm .

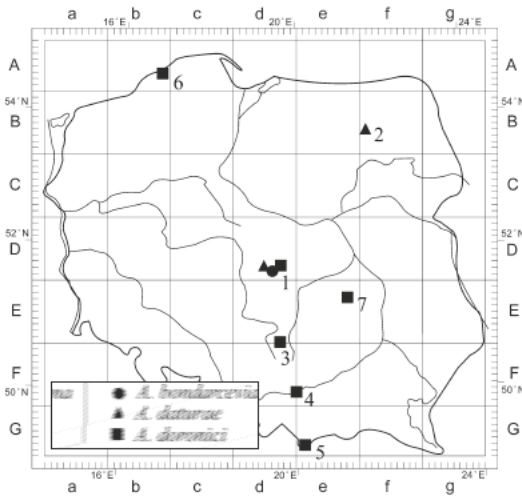


Fig. 2. Distribution of *Ascochyta* species in Poland: 1 – Łódź, 2 – Masurian Lakeland, 3 – Wyżyna Częstochowska Upland, 4 – Kraków, 5 – Tatra Mts, 6 – Słowiński National Park, 7 – Radom.

MATERIAL EXAMINED. On *Ribes* L. sp., Central Poland, Łódź, Staromiejski park, park alley, cultivated, 08 June 2007 & 11 June 2008, leg. E. Poleć, LOD PF 3106, 3107 (Fig. 2).

NOTES. The species is known on the members of the *Grossulariaceae* family: *Grossularia acicularis* (Sm.) Spach, *Ribes nigrum* L., *R. rubrum* L. and *R. uva-crispa* L. from Europe (Bulgaria, Russia) and Asia (Kazakhstan) (Melnik 2000; Farr et al. 2011). The species has been observed in Poland for the first time.

Ascochyta daturae Sacc.

= *A. solanicola* Oudem.

Leaf spots circular or irregular, brown to dark brown. Pycnidia on leaves and on other parts of host plants, scattered or aggregated, sometimes numerous and confluent, semi-immersed, from light to dark brown, globose, globose-depressed or lentiform, 117.5-172.5 x 127.5-175.0 μm , with a circular pore, up to 25.0 μm in diam., surrounded by small dark cells. Conidia cylindrical, oblong-ellipsoidal or slightly clavate, straight or slightly bent, 1-septate, not or slightly constricted, 7.5-10.0 x 2.5-3.9 μm . Morphological features of the specimen generally correspond to those given by Melnik (2000). In pycnidia there is however a contribution of unicellular conidia, 5.0-7.5 x 2.5 μm .

MATERIAL EXAMINED. On *Physalis alkekengi* L., Central Poland, Łódź, Botanical Garden, Sect. of medicinally and industrially important plants, cultivated, 02 Sep. 2004, leg. E. Poleć, LOD PF 3132.

NOTES. The distribution of *Ascochyta daturae* is circumglobal (Melnik 2000; Farr et al. 2011). The species has been noted on living and dry leaves and on other parts of host plants of the *Solanaceae* family. In Poland (Fig. 2) it has been so far recorded only on *Solanum dulcamara* L. as *Ascochyta solanicola* Oud. from alder forest at the Jezioro Warniak Lake and from thickets at the Jezioro Warpuńskie Lake at the Masurian Lakeland (Durska 1974; Sałata 2002). It has been noted on *Physalis alkekengi* L. for the first time in Poland.

***Ascochyta doronici* Allesch.**

Leaf spots circular, oval or irregular, ochraceous, brown or grey-brown. Pycnidia scattered, sometimes aggregated, often confluent, immersed or erumpent, pale to dark brown, sometimes almost black, globose-depressed or lentiform, up to 125.0 μm in diam., with a circular pore, 15.0 μm in diam. Conidia cylindrical or oblong-ellipsoidal, both ends rounded, straight or slightly bent, 1-septate, not or somewhat constricted, 10.0-12.5 x 2.5-3.75 μm . Morphological features of the specimen generally correspond to those mentioned by Melnik (2000).

MATERIAL EXAMINED. On *Achillea millefolium* L. s. str., Central Poland, Łódź, Sielanka park, 15 July 2005, leg. M. Jakiel, LOD PF 2152.

NOTES. Worldwide, *Ascochyta doronici* has been observed on leaves, stems, fruits and seeds of members of 39 genera of the *Asteraceae* family. The distribution of the species is circumglobal (Melnik 2000; Farr et al. 2011). In Poland (Fig. 2) it is so far known on *Artemisia vulgaris* L. from the Parkowe nature reserve near Złoty Potok on the Wyżyna Czeszochowska Upland (Ruszkiewicz-Michalska 2006), on *Hieracium polonicum* Błocki from Botanical Garden in Kraków (Piątek, Wołczańska 2004), on *Homogyne alpina* (L.) Cass. from the Tatra Mts (Mułenko, Kozłowska and Sałata 2004). From more than one locality the species is known only on *Taraxacum officinale* F. H. Wigg.: from Radom, Słowiński National Park and Złoty Potok on the Wyżyna Czeszochowska Upland (Adamska 2001; Ruszkiewicz-Michalska 2006; Sałata 2002; Sałata, Mułenko and Wołczańska 1994). It has been recorded on *Achillea millefolium* L. for the first time in Poland.

***Ascochyta equiseti* (Desm.) Grove**

Leaf spots small, greyish white. Pycnidia on stems, scattered or arranged, immersed, dark brown or black, oval or almost globose, 115.0-130.0 x 120.0-145.0 μm , with a circular pore 20.0-25.0 μm in diam. Conidia oblong-ellipsoidal, oval, both ends rounded, straight, 1-septate, not or slightly constricted, 10.0-12.5 x 2.5-3.75 μm (Fig. 1 C, D).

According to the data of Melnik (2000) pycnidia are 200.0-800.0 μm in diam. and conidia are (8.0-)10.0-16.0 x (2.5-)3.0-4.0(-4.5), while according to the characteristics of Polish specimens given by Sałata (2002) pycnidia are smaller, reaching 160.0-220.0(-330.0) μm in diam. and conidia measure mainly (7.0-)10.0-15.0(-18.0) x (2.5-)3.0-3.5(-4.0).

MATERIAL EXAMINED. On *Equisetum arvense* L., Central Poland, Łódź, Bolesława Chrobrego residential area, park, 01 Oct. 2006, leg. D. Papierz, LOD PF 3025 (Fig. 3).

NOTES. The species has been recorded on dead and dying leaves and stems of *Equisetum* spp. from North America (USA) and many European countries (Melnik 2000; Farr et al. 2011). Although the species was expected by Sałata (2002), it has not been observed in Poland yet.

***Ascochyta euphrasiae* Oudem.**

Leaf spots circular or irregular, grey-brown or grey. Pycnidia scattered, immersed, from yellowish to dark brown, globose-depressed and lentiform, 92.5-120.0 x 105.0-135.5 μm , with a circular pore, up to 20.0 μm in diam. Conidia cylindrical, both ends rounded, straight, sometimes slightly bent, 1-2-septate, not or slightly constricted, 8.75-12.5 x 2.5-3.75 μm .

According to the data of Melnik (2000) pycnidia are up to 200.0 μm in diam. and conidia measure 7.0-12.0(-13.5) x 3.0-4.0, while according to the descriptions given

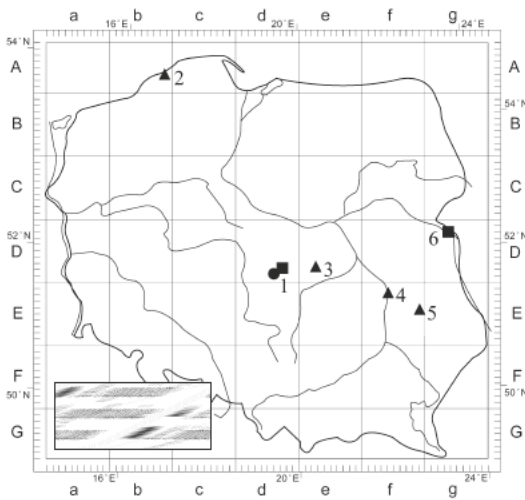


Fig. 3. Distribution of *Ascochyta* species in Poland: 1 – Łódź, 2 – Słowiński National Park, 3 – Konewka nature reserve, 4 – Puławy, 5 – Lublin, 6 – Bohukwały.

by Sałata (2002) pycnidia are 100.0-200.0 μm in diam. and conidia are smaller, reaching 7.0-12.0 x 2.5-4.0.

MATERIAL EXAMINED. On *Digitalis grandiflora* Mill., Central Poland, Konewka nature reserve, *Potentillo albae-Quercetum*, 27 Sept. 2004, leg. A. Kotynia, LOD PF 2558.

NOTES. The species has been noted on living leaves and dry stems of *Scrophulariaceae* members: *Antirrhinum majus* L., *Digitalis* spp., *Euphrasia officinalis* Linn., *Linaria vulgaris* Mill., *Scrophularia nodosa* L., *S. czernjakowskiana* B. Fedtsch. in Asia (Armenia, Kazakhstan) and many European countries (Melnik 2000; Farr et al. 2011). In Poland (Fig. 3) it has been recorded so far only on *Digitalis purpurea* L. in Puławy (Sałata 2002) and Botanical Garden in Lublin (Sałata et al. 1994; Sałata 2002) and on *Linaria vulgaris* Mill. in the Słowiński National Park (Adamska 2001). It has been reported on *Digitalis grandiflora* Mill. for the first time in our country.

Ascochyta infuscans Ellis & Everh.

Leaf spots oval or irregular, ochraceous or brown. Pycnidia scattered or aggregated, immersed, yellowish-brown or brown, globose-depressed or lentiform, 90.0-162.5 x 97.5-165.0 μm , with a circular pore, up to 22.5 μm in diam., surrounded by small dark cells. Conidia cylindrical, both ends rounded, straight or bent, 1-septate, not or slightly constricted, 8.75-15.6 x 3.9 μm . Morphological features of these conidia generally correspond to the dimensions given by Melnik (2000). In pycnidia there is also a contribution of smaller, unicellular conidia, 3.75-7.5 x 1.25-2.5 μm .

MATERIAL EXAMINED. On *Anemone sylvestris* L., Central Poland, Łódź, Botanical Garden, Sect. of Polish flora, cultivated, 08 July 2004, leg. E. Poleć, LOD PF 3133.

NOTES. The species is known worldwide on *Ranunculaceae* members from Europe (Bulgaria, Czechoslovakia, Russia) and North America (Canada, USA) (Melnik 2000; Farr et al. 2011). Seven other species of the genus *Ascochyta* are reported to infect members of the *Ranunculaceae* family (Tab. 1). Four of them have been recorded in Poland so far: *Ascochyta actaeae*, *A. aquilegiae* and *A. dolomitica* (Mułenko, Kozłowska 2008), and *Ascochyta infuscans* collected only in association with *Anemone*

Table 1
Ascochyta species associated with members of *Ranunculaceae*
 (compilation based on the data given by Melnik 2000 and Farr et al. 2011)

	Fungi species	Host species	Conidia (µm)	Distribution
<i>Ascochyta</i> subgenus <i>Ascochyta</i>	<i>A. actaeae</i> (Bres.) Davis	<i>Actaea alba</i> (L.) Mill., <i>A. rubra</i> (Aiton) Willd., <i>A. spicata</i> L., <i>Cimicifuga</i> <i>racemosa</i> (L.) Nutt., <i>Delphinium elatum</i> L., <i>Hydrastis</i> sp., <i>Thalictrum</i> <i>flavum</i> L., <i>T. minus</i> L.	12.0-28.0 x 5.0-7.0	Europe (Estonia, Germany, Latvia, UK, Poland, Russia), North America (USA)
	<i>A. aquilegiae</i> (Rabenh.) Höhn.	<i>Aquilegia</i> spp., <i>Delphinium</i> spp.	10.0-20.0 x (3.0-)4.0-6.0	Europe (Austria, Belarus, Bulgaria, former Czechoslovakia, France, Germany, Hungary, Italy, Poland, Russia), Asia (Armenia), North America (USA), South Africa (Zimbabwe)
<i>Ascochyta</i> subgenus <i>Liberita</i>	<i>A. aconitana</i> Melnik	<i>Aconitum moldavicum</i> Haq.	10.0-15.0(-18.0) x 4.5-6.3	Europe (Romania)
	<i>A. dolomitica</i> Kabát & Bubák	<i>Atragene sibirica</i> L., <i>Clematis alpina</i> (L.) Mill., <i>Clematis</i> spp., <i>Hepatica nobilis</i> Schreb., <i>Ranunculus thora</i> L.	(10.0-)13.0-20.0 (-22.0) x 3.0-5.0	Europe (Austria, former Czechoslovakia, Germany, Latvia, Poland, Romania), Asia (Russia, Kazakhstan)
	<i>A. infuscans</i> Ellis & Everh.	<i>Anemone nemorosa</i> L., <i>A. ranunculoides</i> L., <i>Clematis vitalba</i> L., <i>Helleborus odoratus</i> Waldst. & Kit, <i>Pulsatilla vulgaris</i> Mill., <i>Ranunculus abortivus</i> L., <i>Ranunculus</i> sp.	8.0-15.0(-16.0) x 3.0-4.5	Europe (Bulgaria, former Czechoslovakia, Poland, Russia), North America (Canada, USA)
	<i>A. patagonica</i> Speg.	<i>Aconitum septentrionale</i> Koelle, <i>A. lycoctonum</i> L. emend. Koelle subsp. <i>lycoctonum</i> , <i>Aconitum</i> sp., <i>Anemone riparia</i> Fernald, <i>Anemone</i> <i>sphenophylla</i> Poepp., <i>Aquilegia</i> sp.	(6.5-)8.0-10.0 x 2.5-4.0	Europe (Bulgaria, Hungary, Russia), North America (Canada), South America (Argentina)
	<i>A. savulescui</i> Rădul. & Negru	<i>Thalictrum minus</i> L.	18.0-26.0 x 7.0-10.0	Europe (Romania)
	<i>A. vitalbicola</i> Maire	<i>Clematis vitalba</i> L.	15.0-18.0 x 5.0-6.0	Europe (Bulgaria, Spain)

ranunculoides L. in Bohukaty near Bug river valley (Danilkiewicz 1990; Sałata 2002) (Fig. 3). *Anemone sylvestris* L. is a new host species for the fungus in Poland.

In addition, *Ascochyta vitalbae* (Briard & Hariot) Died. on the members of *Ranunculaceae* (*Clematis recta* L. and *C. vitalba* L.) was reported from Poland. That record was classified as *Ascochyta indusiata* Bres. (Mułenko, Kozłowska 2008); the name is however considered to be a synonym of *Phoma clematidina* (Thüm.) Boerema (Boerema et al. 2004).

***Ascochyta lamiorum* Sacc.**

Leaf spots circular, oblong or irregular, yellow-brown, dark brown or grey-brown. Pycnidia scattered or sometimes aggregated, immersed, light to dark brown, globose or globose-depressed, sometimes lentiform 107.8-150.0 x 110.0-172.5 µm, with a circular pore, 15.0-17.5 µm in diam. Conidia predominantly cylindrical, sometimes

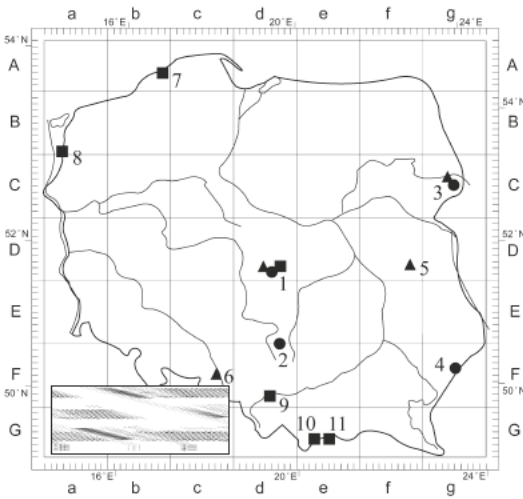


Fig. 4. Distribution of *Ascochyta* species in Poland: 1 – Łódź, 2 – Wyżyna Częstochowska Upland, 3 – Białowieża National Park, 4 – Nowiny Horynieckie, 5 – Firlej, 6 – Zakrzów, 7 – Słowiński National Park, 8 – Szczecin, 9 – Wola, 10 – Pieniny Mts, 11 – Czorsztyn.

oblong-ellipsoidal or slightly clavate, both ends rounded, straight or sometimes slightly flexuous, 1-septate, not or slightly constricted, $7.5\text{--}11.25 \times 2.5\text{--}3.75 \mu\text{m}$. Morphological features of the specimens generally correspond to those described by Melnik (2000).

MATERIAL EXAMINED. On *Glechoma hederacea* L., Central Poland, Łódź, Botanical Garden, Sect. of Japanese garden, 18 July 2004, leg. E. Poleć, LOD PF 2483; Sielanka park, 02 Aug. 2005, leg. M. Jakiel, LOD PF 2235.

NOTES. The species has been noted on living leaves and dry stems of numerous *Lamiaceae* members: *Ajuga laxmannii* (L.) Benth., *A. reptans* L., *Ajuga* sp., *Ballota nigra* L., *Clinopodium vulgare* L., *Coleobrookea oppositifolia* Sm., *Elsholtzia ciliata* (Thunb.) Hyl., *E. densa* Benth., *Galeobdolon luteum* Huds., *Galeopsis tetrahit* L., *Glechoma hederacea* L., *Lallemantia iberica* (MB) Fisch. et Mey. f. *sulfurea*, *Lamium album* L., *L. maculatum* L., *Lycopus europaeus* L., *Monarda fistulosa* L., *Ocimum basilicum* L., *Phlomis alpina* Pall., *Ph. jaiicola* Klok., *Ph. tuberosa* L., *Prunella vulgaris* L., *Scutellaria altissima* L., *Teucrium lamifolium* d’Urv. and *Thymus pulegioides* L. in Asia (Armenia, China, Georgia, India and Kazakhstan) and many European countries (Melnik 2000; Farr et al. 2011). In Poland (Fig. 4) *Ascochyta lamiorum* has been so far observed on *Galeobdolon luteum* Huds. in Białowieża National Park (Mułenko 1996; Faliński, Mułenko 1997) and in Parkowe and Sokole Góry nature reserves on the Wyżyna Częstochowska Upland (Ruskiewicz-Michalska 2006), on *Lamium album* L. in Złoty Potok on the Wyżyna Częstochowska Upland (Ruskiewicz-Michalska 2006) and on *L. maculatum* L. in Nowiny Horynieckie, Southern Roztocze (Sałata et al. 1994; Sałata 2002). It is reported on *Glechoma hederacea* L. for the first time in the country.

Ascochyta leonuri Ellis & Dearn.

= *Ascochyta nepetae* Davis

Leaf spots circular, later irregular, brown. Pycnidia scattered or aggregated in the small, not very dense groups, immersed, ochraceous or brown to dark brown, globose-depressed, $98.0\text{--}125.0 \mu\text{m}$ in diam., with a circular pore, $15.0\text{--}20.0 \mu\text{m}$ in

diam., surrounded by small dark cells. Conidia cylindrical, both ends rounded, straight or slightly flexuous, 0-1-septate, slightly constricted, 10.0-16.25 x 2.5-3.75 μm . Morphological features of the specimen generally correspond to those given by Melnik (2000).

MATERIAL EXAMINED. On *Mentha x citrata* Ehrh. subsp. *citrata*, Central Poland, Łódź, Botanical Garden, Sect. of medicinally and industrially important plants, cultivated, 28 Aug. 2004, leg. E. Połec, LOD PF 3134.

NOTES. The species has been reported on *Lamiaceae* members: *Lamium maculatum* L., *Leonurus cardiaca* L., *Mentha arvensis* L., *M. longifolia* (L.) L., *Nepeta cataria* L., *N. mussinii* Spreng. ex Henckel and *N. pannonica* L. from Asia, North America and many European countries (Melnik 2000; Farr et al. 2011). In Poland (Fig. 4) it is known to occur on *Mentha arvensis* L. in Firlej near Radom (Sałata et al. 1994; Sałata 2002), *Mentha x verticillata* L. in Białowieża National Park (Mułenko 1996; Faliński, Mułenko 1997), *Nepeta cataria* L. var. *citriodora* and *Nepeta* sp. in Zakrzów near Koźle (Miczyńska 1966; Sałata 2002). As *Mentha x citrata* Ehrh. subsp. *citrata* has not been listed among the species infected with *Ascochyta leonuri* (Melnik 2000; Farr et al. 2011) it is presumably a new host of the fungus. According to Boerema et al. (2004) *Ascochyta nepetae* is a synonym of *Phoma nepeticola* (Melnik) Dorenb. & Gruyter.

Ascochyta sodalis Naumov

= *Ascochyta plantaginis* Sacc. & Speg., *A. plantaginicola* Melnik

Leaf spots oval or circular, sometimes irregular, yellowish or brown. Pycnidia immersed, yellow-brown, circular or lentiform, 105.0-150.0 x 125.0-162.5 μm , with a circular pore, 20.0 x 22.5 μm in diam., surrounded by small dark cells. Conidia cylindrical, both ends broadly rounded, straight, very rarely slightly bent, 1-septate, not constricted, 7.5-10.0 x 2.5-3.0 μm . Morphological features of the specimens generally correspond to those listed by Melnik (2000). In pycnidia there is also a contribution of smaller, unicellular conidia, 5.5-7.5 x 2.5-3.0 μm .

MATERIAL EXAMINED. On *Plantago intermedia* Gilib., Central Poland, Łódź, Piłsudskiego park, lawn, 24 June 2005, leg. E. Połec, LOD PF 3135; South Poland, Wola near Pszczyna, meadow of *Molinion caeruleae* alliance, 11 Oct. 2006, leg. A. Myszka LOD PF 2871.

NOTES. The species has been reported on living leaves of *Plantaginaceae* members: *Plantago aristata* Michx., *P. asiatica* L., *P. depressa* Willd., *P. major* L. s. str., *P. media* L., *P. rugelii* Decne. and *Plantago* sp. as well as *Cyperaceae* taxa: *Carex arenaria* and *Carex* sp. from Asia (China, Kazakhstan), North America (USA) and many European countries (Melnik 2000; Farr et al. 2011). In Poland (Fig. 4) it has been so far observed only on *Plantago major* L. s. str. as *Ascochyta plantaginis* in the Słowiński National Park (Adamska 2001), in the Pieniny Mts (Kućmierz 1976a, b, 1977), in Szczecin city and its vicinity (Madej 1974).

It is reported on *Plantago intermedia* Gilib. for the first time. However, as *P. intermedia* was previously included in *Plantago major* L. as subspecies *intermedia* (DC.) Arcang., thus some of the records of *Ascochyta sodalis* on *P. major* may, in fact, concern *P. intermedia*.

Ascochyta sonchi (Sacc.) Grove= *Ascochyta cirsii* Died.

Leaf spots circular or oblong, brown. Pycnidia scattered or aggregated, somewhat erumpent, sometimes immersed, pale to dark brown or almost black, globose-depressed, 87.5-107.5 x 105.0-125.0 μm , with a circular pore, 25.0 μm in diam. Conidia ellipsoidal, oblong-ellipsoidal, ovate, both ends rounded, straight, sometimes slightly bent, 1-2-septate, not or slightly constricted, 6.25-11.25 x 2.5-3.75 μm .

According to the data of Melnik (2000) pycnidia are up to 200.0(-250.0) μm in diam. and conidia are (6.0-)8.0-10.0 x (2.0-)3.0-4.0(-5.0), while according to the characteristics of Polish specimens given by Salata (2002) pycnidia are 100.0-200.0(-250.0) μm in diam. and conidia measure mainly (6.0-)8.0-10.0(-11.5) x (2.0-)3.0-4.0(-5.0).

MATERIAL EXAMINED. On *Galinsoga parviflora* Cav., Central Poland, Łódź, Retkinia residential area, lawn, 11 Sept. 2008, leg. E. Poleć, LOD PF 3136.

NOTES. *Ascochyta sonchi* has been reported on living leaves and dry stems of *Asteraceae* members: *Achillea millefolium* L. s. str., *Arctium minus* (Hill) Bernh., *Cirsium arvense* (L.) Scop., *C. helenioides* (L.) Hill, *Inula britannica* L., *I. conyza* DC., *Ligularia tussilaginea* (Burm. f.) Makino var. *formosana* Hayata, *Onopordum acanthium* L., *Sonchus arvensis* L., *S. asper* (L.) Hill, *S. oleraceus* L. and *Sonchus* sp. from Asia (Japan, Russia) and many European countries (Melnik 2000; Farr et al. 2011).

In Poland (Fig. 5) it has been so far observed on *Cirsium arvense* (L.) Scop. as *Ascochyta cirsii* near Gubin (Diedicke 1915) and on *C. oleraceum* (L.) Scop. in Białowieża National Park (Mułenko 1996; Faliński, Mułenko 1997). It is reported on *G. parviflora* for the first time in Poland. According to Aveskamp et al. (2010) this species is a synonym of *Boeremia* (= *Phoma*) *exigua* (Desm.) Aveskamp, Gruyter & Verkley var. *exigua*.

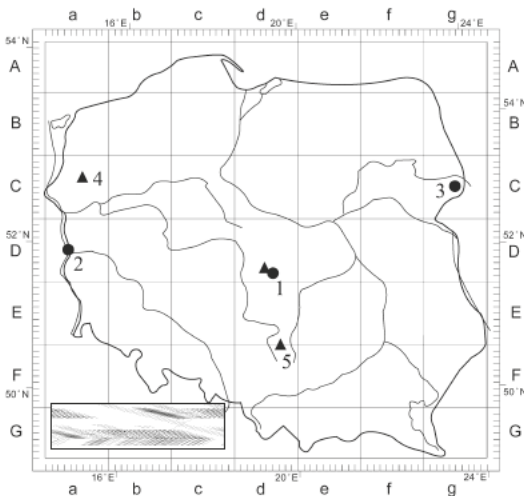


Fig. 5. Distribution of *Ascochyta* species in Poland: 1 – Łódź, 2 – Gubin, 3 – Białowieża National Park, 4 – Przelewiec, 5 – Wyżyna Częstochowska Upland.

***Ascochyta verbascina* Thüm.**

Leaf spots oval or irregular, light brown or whitish. Pycnidia scattered or aggregated in the small groups, immersed, pale yellow, brown to almost black, globose-depressed and lentiform, 92.5-107.5 x 102.5-172.5 µm, with a circular pore, 20.0-25.0 µm in diam., surrounded by small dark cells. Conidia cylindrical, both ends rounded, straight or slightly bent, 0-1-septate, not constricted, 6.25-10.0 x 2.2-2.5 µm. Morphological features of the specimen generally correspond to those described by Melnik (2000).

MATERIAL EXAMINED. On *Veronica chamaedrys* L. s. str., Central Poland, Łódź, Łagiewnicki forest, roadside, 06 Oct. 2006, leg. E. Połec, LOD PF 3137.

NOTES. The species has been noted on living leaves and dry stems of *Scrophulariaceae* members: *Rhinanthus minor* L., *Verbascum blattaria* L., *V. densiflorum* Bertol., *V. nigrum* L., *V. sinuatus* L., *Verbascum* sp., *Veronica beccabunga* L., *V. chamaedrys* L. s. str., *V. officinalis* L. and *V. urticifolia* Jacq., as well as on *Lamiaceae* representative – *Scutellaria altissima* L. from Europe (Austria, Bulgaria, Hungary, Latvia, Russia, Ukraine) (Melnik 2000; Farr et al. 2011). In Poland (Fig. 5) it has so far been observed on *Verbascum densiflorum* Bertol. in the dendrological garden in Przelewiec (near the Szczecin city) (Madej 1969; Sałata 2002), and on *V. lychnitis* L. and *Veronica* sp. in Olsztyn near Częstochowa on the Wyżyna Częstochowska Upland (Połec 2005; Ruszkiewicz-Michalska 2006). It is recorded on *Veronica chamaedrys* L. s. str. for the first time in Poland.

FINAL REMARKS

Although the genus *Ascochyta* has been monographed in Poland quite recently (Sałata 2002), 60 new species for Poland were reported within the following years (Mułenko, Kozłowska 2008; Wołczańska 2010). The recent finding of eleven interesting species of this genus, including two new for Poland, also proves that further investigations in natural and anthropogenic habitats are needed.

The taxonomy of *Ascochyta* species changes in time. According to Punithalingam (1988) 1-septate conidia are the norm for the genus *Ascochyta*. However, the occurrence of a small percentage of unicellular and 2-septate conidia is possible and it does not exclude the species from the genus. The subgenus *Ascochyta* is characterized with the admixture of 3-4-celled conidia (Melnik 2000). In the opinion of Boerema et al. (2004) mature conidia of true *Ascochyta* species are almost always septate and their conidiogenesis differs from the one observed in *Phoma* species. The conidia of *Phoma* taxa are always unicellular when released, but some of them can become two- or more-celled by secondary septation.

According to Boerema et al. (2004) many taxa referred to as *Ascochyta* species are, in fact, the members of *Phoma* genus. This concerns some of the species presented in the current report: *Ascochyta leonuri* (= *A. nepetae*) is a synonym of *Phoma nepeticola* (Melnik) Dorenb. & Gruyter as well as *Ascochyta daturae* and *Ascochyta sonchi* are the synonyms of *Boeremia exigua* var. *exigua*. In the checklist of

Polish micromycetes these species are still numbered among the *Ascochyta* species (Mułenko, Kozłowska 2008).

To distinguish members of the genus *Ascochyta* from *Phoma* species with secondary conidial septation, the *in vitro* studies are needed (Boerema et al. 2004). Thus, the revision of the genus *Ascochyta* based on *in vitro* studies and molecular analyses is necessary. Our observations indicate that some of the species included currently to the genus *Ascochyta* may also belong to *Phoma* Fr. s.l. (e.g., *Ascochyta infuscans* and *Ascochyta sodalis*), as in their pycnidia there is a contribution of unicellular conidia of variable shape and size.

Acknowledgements. The authors are indebted to Professor Maria Ławrynowicz, Curator of the Fungal Collection of Herbarium Universitatis Lodziensis (LOD), for permission to analyse herbarium materials. They include single specimens collected by MSc students supervised by the second author: Aleksandra Kotynia, Magdalena Jakiel, Danuta Papierz and Agnieszka Mysza, whose contribution is greatly acknowledged. We are also grateful to two anonymous reviewers for valuable remarks on the manuscript. The studies were partially supported by the Ministry of Science and Higher Education (grant no N305 077 32/2708). The first author was also granted in the frame of the project “Scholarships to support innovative doctoral research” by the European Social Fund and the Budget as a part of Integrated Regional Operational Programme.

REFERENCES

- Adamska I. 2001. Microscopic fungus-like organisms and fungi of the Słowiński National Park. II. (NW Poland). *Acta Mycol.* 36 (1): 31–65.
- Aveskamp M., de Gruyter H., Woudenberg J., Verkley G., Crous P.W. 2010. Highlights of the *Didymelaceae*: A polyphasic approach to characterise *Phoma* and related pleosporalean genera. *Stud. Mycol.* 65: 1–64.
- Boerema G. H., de Gruyter J., Noordeloos M. E., Hamers M. E. C. 2004. *Phoma* identification manual. Differentiation of specific and infra-specific taxa in culture. CABI Publishing, Wallingford, 448 pp.
- Buchanan P. K. 1987. A reappraisal of *Ascochyta* and *Ascochyella* (Coelomycetes). *Mycol. Pap.* 156: 1–83.
- Chlebicki A. 2002. Biogeographic relationships between fungi and selected glacial relict plants. The use of host – fungus data as an aid to plant geography on the basis of material from Europe, Greenland and northern Asia. *Monogr. Bot.* 90: 1–230.
- DAISIE: *Delivering Alien Invasive Species Inventories for Europe*; www.europe-aliens.org
- Danilkiewicz M. 1990. Parasitic fungi of river Bug valley. *Acta Mycol.* 23 (2): 37–80.
- Diedicke H. 1915. Kryptogamenflora der Mark Brandenburg. Bd. IX. Pilze VII. *Sphaeropsidae, Melanconieae*. Verl. von Gebrüder Borntraeger, Leipzig, 962 pp.
- Durska B. 1974. Studies on parasitic fungi of plants occurring in the lake littoral of the Masurian Lakeland. *Acta Mycol.* 10 (1): 73–139.
- Faliński J. B., Mułenko W. (eds). 1997. Cryptogamous plants in the forest communities of Białowieża National Park. Ecological Atlas (Project *CRYPTO 4*). *Phytocoenosis* 9 (N.S.) Supplementum Cartographiae Geobotanicae 7: 1–522.
- Farr D. F., Rossman A.Y., Palm M.E. & McCray E.B. 2011. Fungal Databases, Systematic Botany & Mycology Laboratory, ARS, USDA [Retrieved 17.05.2011, from the Database at <http://nt.ars-grin.gov/fungaldatabases/>].
- Kirk P.M., Cannon P.F., Minter D.W., Stalpers J.A. 2008. *Ainsworth & Bisby's Dictionary of the Fungi*. 10th Ed. CAB International, Wallingford: p. 54.
- Kowalski T. 2004. Endophytic fungi: VI. Mycobiota in living symptomless leaves of *Ulmus glabra* and in necrotic tissues associated with gall-making insects. *Phytopathol. Pol.* 32: 61–73.
- Kozłowska M., Mułenko W. 2005. Notes on some species of *Ascochyta* (Coelomycetes) new and rare for Poland. *Acta Mycol.* 40 (1): 43–47.
- Kućmierz J. 1976a. New and rare for Poland species of Deuteromycetes collected in the area of the Pienniny Mts (Western Carpatians). *Fragm. Flor. Geobot.* 22: 141–146.

- Kućmierz J. 1976b. Flora of parasitic fungi of the Pieniny Mountains (Western Carpatians). Part II. Basidiomycetes, Deuteromycetes. *Fragm. Flor. Geobot.* 22: 605–622.
- Kućmierz J. 1977. Investigation on the parasitic fungi from the Pieniny Mts. *Zeszyty Naukowe Akademii Rolniczej w Krakowie* 137, *Rozprawy* 52: 1–142.
- Madej T. 1969. Mycoflora of herbs of the dendrologic garden in Przelevice (Szczecin voivode). *Fragm. Flor. Geobot.* 15: 99–110.
- Madej T. 1974. The materials for mycoflora of plants of Szczecin province. *Akademia Rolnicza w Szczecinie, Rozprawy* 35: 1–235.
- Melnik V. 2000. Key to the fungi of the genus *Ascochyta* Lib. (Coelomycetes). *Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft Berlin-Dahlem. Heft* 379. Berlin, 192 pp.
- Miczyńska Z. 1966. Materials to the knowledge of diseases occurring on medical herbs cultivated in Poland. I. Diseases of medical herbs of the families: *Labiatae*, *Scrophulariaceae* and *Boraginaceae* observed during the years 1951–1962. *Rocz. Nauk Roln., Ser. A* 92 (2): 285–312.
- Mirek Z., Piękoś-Mirkowa H., Zajac A., Zajac M. 2002. Flowering plants and pteridophytes of Poland. A checklist. (In:) Z. Mirek (ed.). *Biodiversity of Poland 1*. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 442 pp.
- Muńlenko W. 1996. Parasitic microfungi and their hosts collected on the study area. (In:) J. B. Faliński, W. Muńlenko (eds). *Cryptogamous plants in the forest communities of Białowieża National Park. Functional groups analysis and general synthesis (Project CRYPTO 3)*. *Phytocoenosis* 8 (N.S.), *Archiv. Geobot.* 6: 55–65.
- Muńlenko W., Kozłowska M. 2008. Genus *Ascochyta*. (In:) W. Muńlenko, T. Majewski, M. Ruskiewicz-Michalska (eds). *A preliminary checklist of micromycetes in Poland*. (In:) Z. Mirek (ed.). *Biodiversity of Poland 9*. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków: 514–529.
- Muńlenko W., Kozłowska M., Salata B. 2004. Microfungi of the Tatra National Park. A checklist. (In:) Z. Mirek, M. Ronikier (eds). *Biodiversity of the Tatra National Park. 1*. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 72 pp.
- Muńlenko W., Wojdyło B. 2002. Mikroskopijne grzyby pasożytnicze drzew i krzewów Arboretum Bolestraszyce. *Arboretum Bolestraszyce* 9: 5–14.
- Piątek M., Wołczańska A. 2004. Some phytopathogenic fungi rare or new to Poland. *Polish Bot. J.* 49 (1): 67–72.
- Połeć E. 2005. Contribution to the knowledge of the phytopathogenic micromycetes of the Częstochowa Upland. (In:) K. Czyżewska, J. Hereźniak (eds). *Biodiversity in relation to vegetation zones in Europe*. University of Łódź Publishing House, Łódź: 187–193.
- Połeć E. 2010. Grzyby pasożytnicze roślin terenu miasta Łodzi. Praca doktorska wykonana w Katedrze Algologii i Mikologii Uniwersytetu Łódzkiego, 108 + LXXX pp. (mscr).
- Punithalingam E. 1979. Graminicolous *Ascochyta* species. *Mycol. Pap.* 142: 1–214.
- Punithalingam E. 1988. *Ascochyta* II. Species on monocotyledons (excluding grasses), cryptogams and gymnosperms. *Mycol. Pap.* 159: 1–235.
- Ruskiewicz-Michalska M. 2006. Phytoparasitic micromycetes in plant communities of the Wyżyna Częstochowska Upland. *Monogr. Bot.* 96: 1–140.
- Rutkowski L. 2004. *Klucz do oznaczania roślin naczyniowych Polski niżowej*. PWN, Warszawa, 814 pp.
- Salata B. 2002. *Polskie gatunki grzybów mitosporowych z rodzaju Ascochyta*. Wyd. Uniwersytetu Marii Curie-Skłodowskiej, Lublin, 121 pp.
- Salata B., Muńlenko W., Wołczańska A. 1994. New and rare species of *Sphaeropsidales* to the Polish flora. *Acta Mycol.* 29 (1): 81–93.
- Szafer W., Kulczyński S., Pawłowski B. 1986. *Rośliny polskie*. PWN, Warszawa, 1019 pp.
- Wołczańska A. 2010. Interesting collections of phytopathogenic fungi. *Acta Mycol.* 45 (1): 91–96.

Interesujące gatunki grzybów z rodzaju *Ascochyta*

Streszczenie

W pracy przedstawiono jedenaście gatunków mikroskopowych grzybów pasożytniczych należących do rodzaju *Ascochyta* (grzyby anamorficzne). Dwa z nich – *Ascochyta bondarceviana* Melnik (na *Ribes* sp.) i *Ascochyta equiseti* (Desm.) Grove (na *Equisetum arvense* L.) – są nowe dla bioty kraju, a pozostałe dziewięć gatunków stwierdzono na żywicielach, na których nie były one dotąd obserwowane w Polsce. Grzyby te zostały zebrane w Polsce środkowej i południowej, przy czym większość z nich została zaobserwowana na terenie Łodzi. Dla wszystkich gatunków podano krótkie opisy cech struktur morfologicznych i rozmieszczenie, a gatunki notowane w Polsce po raz pierwszy zostały również zilustrowane mikrofotografiami.