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New collections of *Ramularia* species (Hyphomycetes) in Poland

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Two species of parasitic fungi new for Poland belonging to the genus *Ramularia* Unger: *Ramularia cortusae* Petr. (on *Cortusa matthioli* L.) and *R. crassiuscula* (Unger) U. Braun (on *Delphinium oxysepalum* Borb. et Pax), collected in the Tatra National Park (Western Carpathians), are described, illustrated and their distribution is given.

Key words: *Ramularia*, anamorphic fungi, Hyphomycetes, distribution, Poland

INTRODUCTION

Two fungal species belonging to the genus *Ramularia* Unger new for Poland were collected during field studies conducted in recent years. These are *Ramularia cortusae* (on *Cortusa matthioli* L.) and *R. crassiuscula* (Unger) U. Braun (on *Delphinium oxysepalum* Borb. et Pax). Both species were found in the Tatra National Park, on rare plants or plants under protection whose range of occurrence in Poland is limited only to the West Carpathians (Zając and Zając 2001).

Cortusa matthioli (Primulaceae), listed in *Polish Red Data Book of Plants*, is a lower risk species (Kaźmierczakowa and Zarzycki 2001). It is an European species which occupies a disjunctive range, and is found frequently only in the Alps and the Carpathian Mountains. It also occurs in a few localities in the Balkan Peninsula, Ural and lowland areas in north-eastern Europe.

The fungal species *Ramularia cortusae* collected on the plant is recorded quite infrequently. It has so far been reported from a few localities in 4 European countries and from one locality in central Asia. The localities of the fungus are not too numerous but the range of its occurrence on the whole overlaps with the range of its host plant. Further investigations are required to study its distribution in greater depth.

Delphinium oxysepalum (Ranunculaceae) is a high mountain (subalpine-alpine) species. It is also a Western-Carpathian endemic species with the main centre of its distribution in the Tatra Mts. Outside this area, it occurs in the range of Choč, the

Malá Fatra Mts., Nízke Tatry Mts. and Muranska Planina (all localities in Slovakia) (Piękoś-Mirkowa et al. 1996).

The fungal species (*Ramularia crasiuscula*) recorded on the plant occurs frequently and is known from many localities across the world (Braun 1998). However, *Delphinium oxysepalum* is a new host for the fungus. Infected plant individuals were collected at the elevation above 2000 m a.s.l. It is the most highly elevated locality of the fungus in the world.

Ramularia cortusae Petr., Ann. Mycol. 23:90.1925;
Ovularia cortusae Picb., *Ramularia cortusae* Săvul. et Sandu

Leaf spots brownish, angular, usually bordered with nerves, 5-12 x 4-6 mm, sometimes aggregating and covering a considerable part of the leaf. Caespituli whitish, conspicuous, hypophyllous. Conidiophores 1–2(-3)-celled, 10–112 (-125) x 1.5–4 μm, usually 20–40 x 2.5–3 μm. Long conidiophores sometimes forming creeping secondary hyphae with short lateral conidiophores. Conidia usually 1–2-celled, less frequently 3-celled, cylindrical, narrowly ovate to ellipsoid, 8–25(-30) x 2–3(-4) μm. Developing in chains (Fig. 1).

Host and locality: on *Cortusa matthioli* L. (Primulaceae): Tatra Mts: Tatra National Park, Western Tatra, Dolina Małej Łąki valley, 1000–1050 m a.s.l., herbaceous plants by a stream, commonly: 17.08.83, leg. W. Mułenko (LBLM 8460), 19.07.99, leg. A. Wołczańska (LBLM 8461).

Distribution: the nearest, quite numerous localities of *Ramularia cortusae*, are known from the Slovakian Tatras (Starmachowa 1963). The fungus was also collected in Asia (Kirghizia) and in a number of other European countries: Austria, Switzerland, the Czech Republic and Romania. It is also known on *Cortusa turkestanica* Losinsk. from central Asia (Uzbekistan) (Braun 1998).

Remarks: a brief contribution (symbol ‚PL') on the occurrence of *Ramularia cortusae* in Poland is given in Braun's monograph study (1998). However, the findings on the collection of the fungus in Poland have not been published so far. The author (Braun l.c.) included the data on the basis of the herbarium collections forwarded to him for re-identification. Thus, *Ramularia cortusae* is treated as a species new for Poland in the present paper.

Fungi belonging to the genus *Ramularia* occur on representatives of the family Primulaceae in Poland quite infrequently. Only three species have been recorded so far: *Ramularia interstitialis* (Berk. et Broome) Gunnerb. et Constant. and *R. primulae* Thüm. (on *Primula elatior* (L.) Hill, *P. veris* L., *Primula* sp.), and *Ramularia lysimachiae* Thüm. (on *Lysimachia nummularia* L., *L. thyrsiflora* L., *L. vulgaris* L.) (Wołczańska 1997).

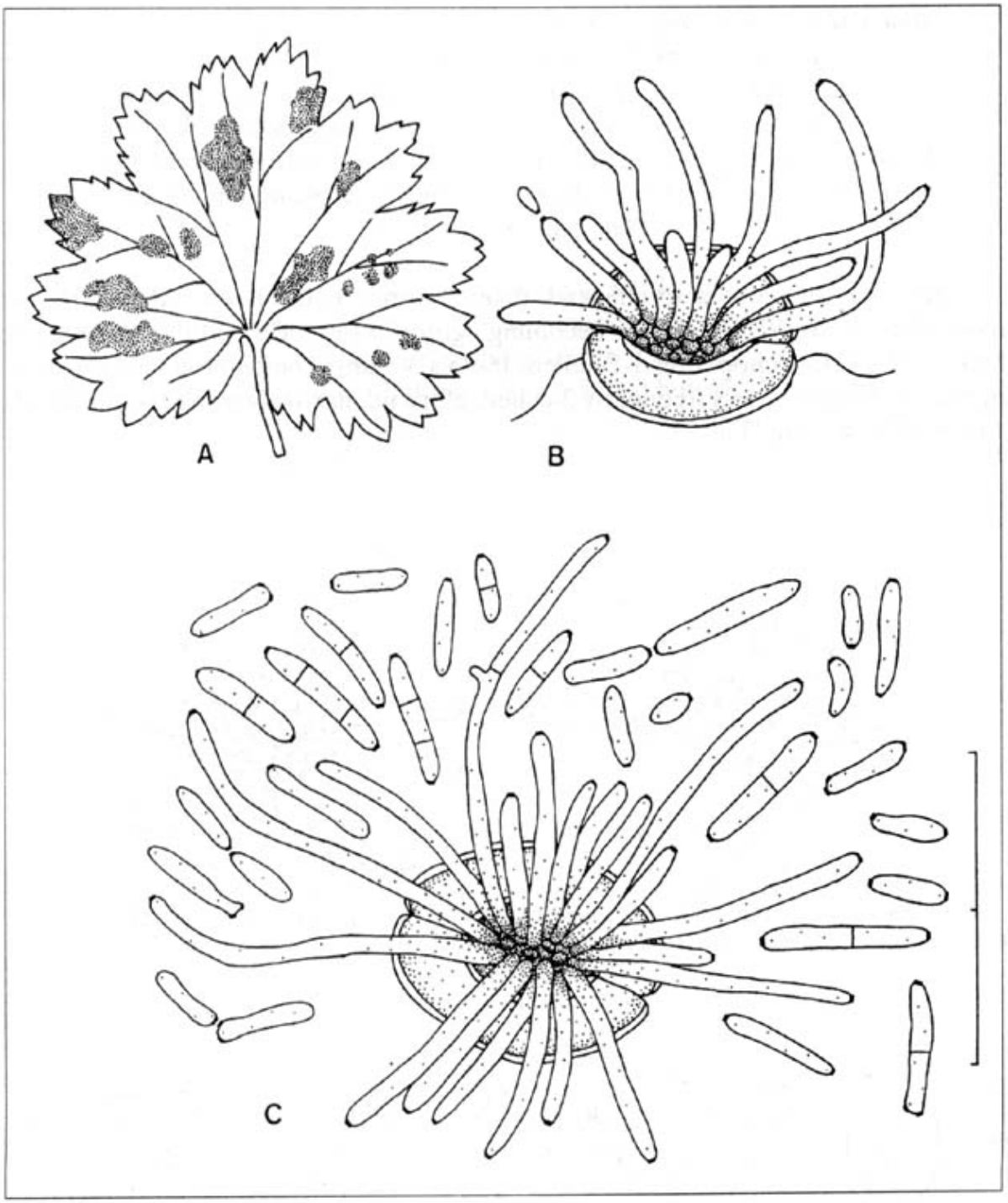

Fig. 1. Morphology of *Ramularia cortusae*: A – infected leaf of *Cortusa matthioli* (orig. size); B, C – conidiophores and conidia (scale bar for B and C = 60 μm).

Ramularia crassiuscula (Unger) U. Braun, Nova Hedwigia 47:340.1988;
Cercospora delphinii Thüm., *Ramularia monticola* Speg.,
Cylindrospora crassiuscula Unger, *Ramularia delphinii* Jaap,
Ramularia brevipes Sacc., *Ramularia albowiana* Siemaszko,
Ramularia monticola f. *maculicola* Gonz. Frag., *Cercospora aconiti* Petr.,
Ramularia aconiti (Petr.) Pénzes, *Ramularia delphinii* Unamuno,
Ramularia napelli Speg.

Leaf spots subglobose to ellipsoid, diam. 3-6 mm, light brown with a dark, almost black, margin. Spot centre becoming lighter in time. Caespituli conspicuous, hypophyllous. Conidiophores 1-2-celled, 16-45 x 3-5 μm. Conida produced singly or in chains, usually 1-, less frequently 2-celled, ellipsoid, narrowly ovate to cylindrical, 14-35(-40) x 4-8 μm (Fig. 2).

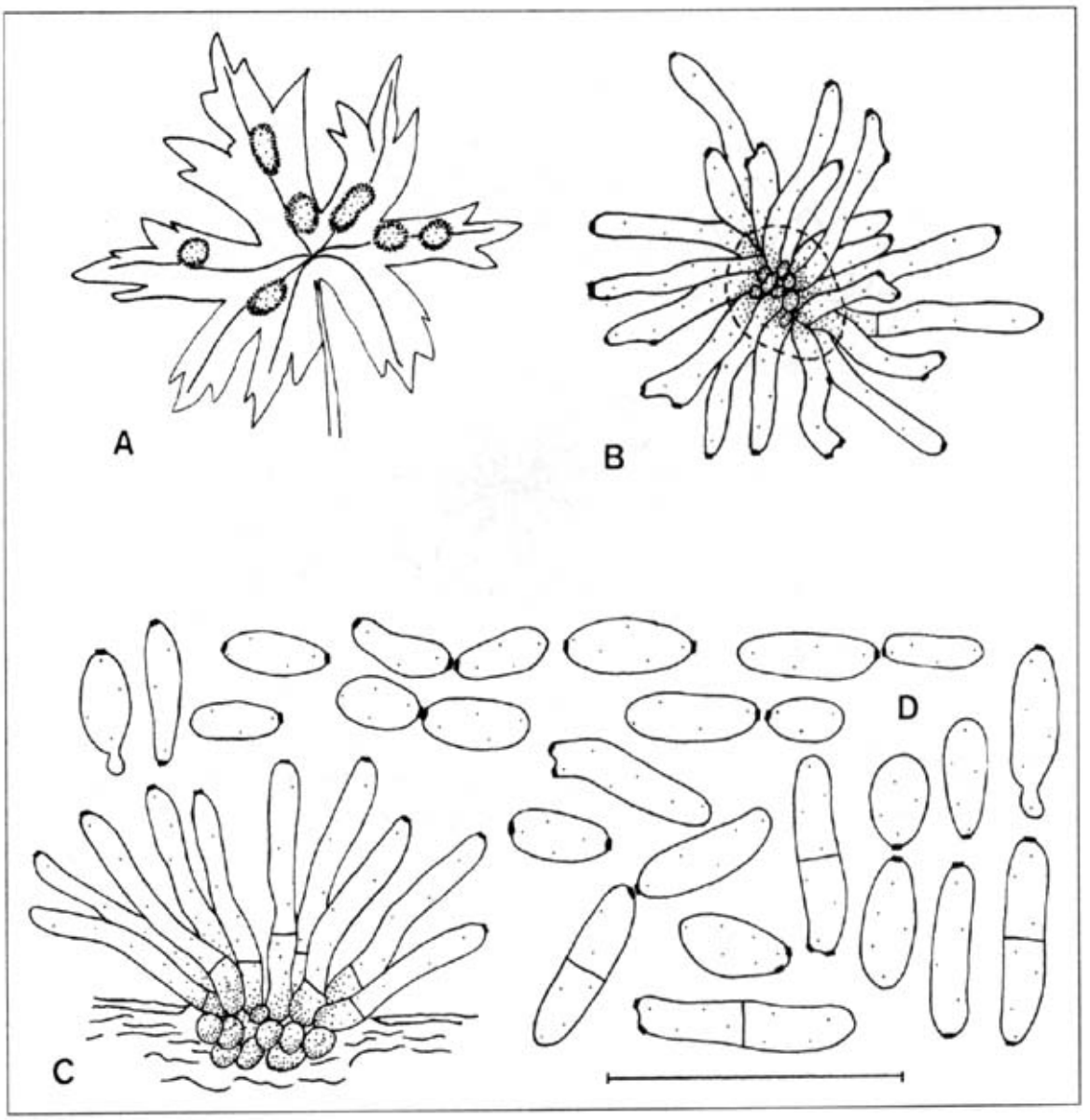

Fig. 2. Morphology of *Ramularia crassiuscula*: A – infected leaf of *Delphinium oxysepalum* (orig. size); B, C – conidiophores and conidia (scale bar for B and C = 50 μm).

Host and locality: on *Delphinium oxysepalum* Borb. et Pax (Ranunculaceae): Tatra Mts: Tatra National Park, Western Tatra, Ciemniak peak, 2016 m a.s.l., alpine belt, single collection: 22.08.83, leg. W. Mułenko (LBLM 8462).

Distribution: *Ramularia crassiuscula* is a species recorded often in the world. The fungus infects representatives of 2 genera: *Aconitum* (15 species) and *Delphinium* (24 species). Numerous localities of the parasite occur in Europe, Asia, in the Caucasus, in Northern Africa, North America, and the Canary Islands (Braun 1998). However, it was not collected on *Delphinium oxysepalum*.

Remarks: Another species belonging to the genus *Ramularia*, *Ramularia delphiniicola* U. Braun, known only from North America, also occurs on species of the genus *Delphinium*. Its conidiophores whose length is 15-80 x 2.5-5 μm and conidia whose size is somewhat similar [10-30(-35) x 4-8 μm] but which are one-celled and are produced singly (Braun 1998) differentiates it from the present species.

In Poland, fungi belonging to the genus *Ramularia* have not been collected on *Aconitum* spp. and *Delphinium* spp. so far. However, 5 species are known on other representatives of the family Ranunculaceae: *Ranunculus* and *Caltha*. Four species: *Ramularia acris* Lindr., *R. didyma* Ung. var. *didyma*, *R. didyma* var. *exigua* (U.Braun) U.Braun and *R. simplex* Pass., occur on species belonging to the genus *Ranunculus* (*R. acris* L., *R. auricomus* L., *R. bulbosus* L., *R. lanuginosus* L., *R. linqua* L., *R. polyanthemos* L., *R. repens* L., *R. sardosus* Crantz, *R.* sp.). Only one species, *Ramularia calthae* Lindr. is known on species belonging to the genus *Caltha* (*Caltha laeta* Schott, Nyman et Kotschy, *C. palustris* L.) (Wołczańska 1997).

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Nowe gatunki z rodzaju *Ramularia* (Hyphomycetes) w Polsce

Streszczenie

Podczas badań terenowych zebrano dwa nowe dla Polski gatunki grzybów pasożytniczych z rodzaju *Ramularia* Unger: *Ramularia cortusae* (na *Cortusa matthioli* L.) oraz *R. crassiuscula* (Unger) U. Braun (na *Delphinium oxysepalum* Borb. et Pax). Oba zebrano w Tatrzańskim Parku Narodowym, na roślinach rzadkich lub chronionych, których zasięg w Polsce ogranicza się do rejonu Karpat Zachodnich. *Delphinium oxysepalum* jest nowym żywicielem dla stwierdzonego na niej gatunku pasożyta.