

***Stethorus pusillus* (Coleoptera: Coccinellidae) as a host
of the ectoparasitic fungus *Hesperomyces coccinelloides*
(Ascomycota: Laboulbeniales: Laboulbeniaceae) in Poland**

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ABSTRACT. The laboulbenian fungus *Hesperomyces coccinelloides* (THAXTER) THAXTER is known to be an obligate ectoparasite of beetles belonging to the coccinellid subfamily Scymninae. It has been reported from several regions in the world, mostly tropical and subtropical localities. This paper reports the first records of *H. coccinelloides* from Poland. The parasitic thalli were found growing on the elytra of *Stethorus pusillus* (HERBST) specimens collected in two adjacent localities in the vicinity of Warsaw.

KEY WORDS: Coccinellidae, *Stethorus pusillus*, Laboulbeniales, *Hesperomyces coccinelloides*, Poland.

INTRODUCTION

The order Laboulbeniales consists of about 2000 described species. All of them are obligate ectoparasites of insects and some other arthropods, with beetles (Coleoptera) being their most frequent hosts (WEIR & HAMMOND 1997, MAJEWSKI 2008). Laboulbenian fungi grow as multicellular thalli on the integument of living arthropods, doing little harm to their hosts (TAVARES 1979, KAUR & MUKERJI 2006).

Members of the family Coccinellidae have been reported to host four species of the laboulbenian genus *Hesperomyces* THAXTER: *H. chilomenis* (THAXTER) THAXTER, *H. hyperaspidis* THAXTER, *H. virescens* THAXTER and *H. coccinelloides* (THAXTER) THAXTER. While the former two species are only known from single type specimens and THAXTER's original (1918, 1931) descriptions, more data are available for *H. virescens* and *H. coccinelloides*. *H. virescens* seems to be the most abundant and widespread of all

Hesperomyces species. It is a parasite of about 20 known hosts from three coccinellid subfamilies (Coccinellinae, Chilocorinae and Scymninae) with a nearly cosmopolitan distribution. There are far fewer records of *H. coccinelloides*. Its host range is probably restricted to minute species of Scymninae, and its geographical distribution includes North, Central and South America (USA, Panama, Ecuador, Brazil), the Caribbean (Grenada, Jamaica), the Philippines and Borneo, and Europe (Spain, Belgium) (CERYNGIER et al. 2012).

So far, no *Hesperomyces* species has been found to occur in Poland, despite the long tradition of Polish studies on Laboulbeniales dating back to pre-Second World War times (SIEMASZKO & SIEMASZKO 1928, 1932, 1934) and the meticulous long-term survey of this group by MAJEWSKI (2008). However, in 2007 M.K. KOZŁOWSKI (pers. comm.) found and photographed several individuals of the two-spot ladybird (*Adalia bipunctata*) infected by laboulbenian fungi (most probably *H. virescens*) in Warsaw. The photograph of one of those ladybirds can be found in KOZŁOWSKI (2009, p. 177). Unfortunately, none of the infected beetles was collected for examination of the fungus.

Here, the first finding of *H. coccinelloides* in Poland is reported. The recorded host is the smallest European ladybird beetle, *Stethorus pusillus* (HERBST).

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MATERIAL AND METHODS

Stethorus pusillus specimens were collected on 24 July 2012 from roadside white willow (*Salix alba*) trees in Łomianki Dolne near Warsaw (52°22'N, 20°53'E, UTM: DD90) and on 25 September 2012 from various trees and shrubs (*Acer campestre*, *Euonymus europaea*, *Humulus lupulus*, *Prunus padus*) in the nearby floodplain forest on the bank of the River Vistula (52°22'N, 20°54'E, UTM: DD90). Examination of the beetles in the laboratory revealed that some of them were infected by laboulbenian fungi. To identify the parasite, its thalli were gently detached from the host's cuticle and mounted on permanent slides.

RESULTS

Two of the six *S. pusillus* specimens collected in July from the roadside willows and one of the eight specimens collected in September in the floodplain forest appeared to be

infected by *H. coccinelloides*. In each of the infected beetles the fungal thalli were situated on the elytra (Fig. 1). Four and twenty-two mature thalli were found on the two hosts in the July sample, while the infected specimen collected in September bore 11 mature thalli. As in many other Laboulbeniales, the thallus of *H. coccinelloides* consists of a receptacle with a melanized foot, a perithecium where ascospores are produced and an appendage bearing spermatia-producing antheridia (Fig. 2). The characteristic feature of the thallus of *H. coccinelloides*, a crown-like structure on the perithecial tip with four lobes reaching a similar height, is well visible on Fig. 2. In mature thalli of *H. virescens*, the two upper lobes are much longer than the two lower lobes (see SANTAMARIA 2003, DE KESEL 2011).



Fig. 1. *Stethorus pusillus* with thalli of *Hesperomyces coccinelloides* on its elytra. The arrow shows a group of thalli (photo: Piotr Ślipiński).

DISCUSSION

Our finding of *Hesperomyces coccinelloides* is the third record of this species in Europe and the second one from *Stethorus pusillus*. Previously, *H. coccinelloides* was found in Spain on a single specimen of an undetermined *Scymnus* species (SANTAMARIA 1995) and

in Belgium on a single specimen of *S. pusillus* (DE KESEL 2011). Although more abundant material was collected in the present study (3 infected specimens among 14 specimens collected in two samples), it is still far too little for calculating reliable rates of parasitization of *S. pusillus* by *H. coccinelloides*. Nevertheless, one may surmise that with more than one fifth of the ladybird specimens carrying the parasites, the association of *H. coccinelloides* with *S. pusillus* is not rare in the area investigated.

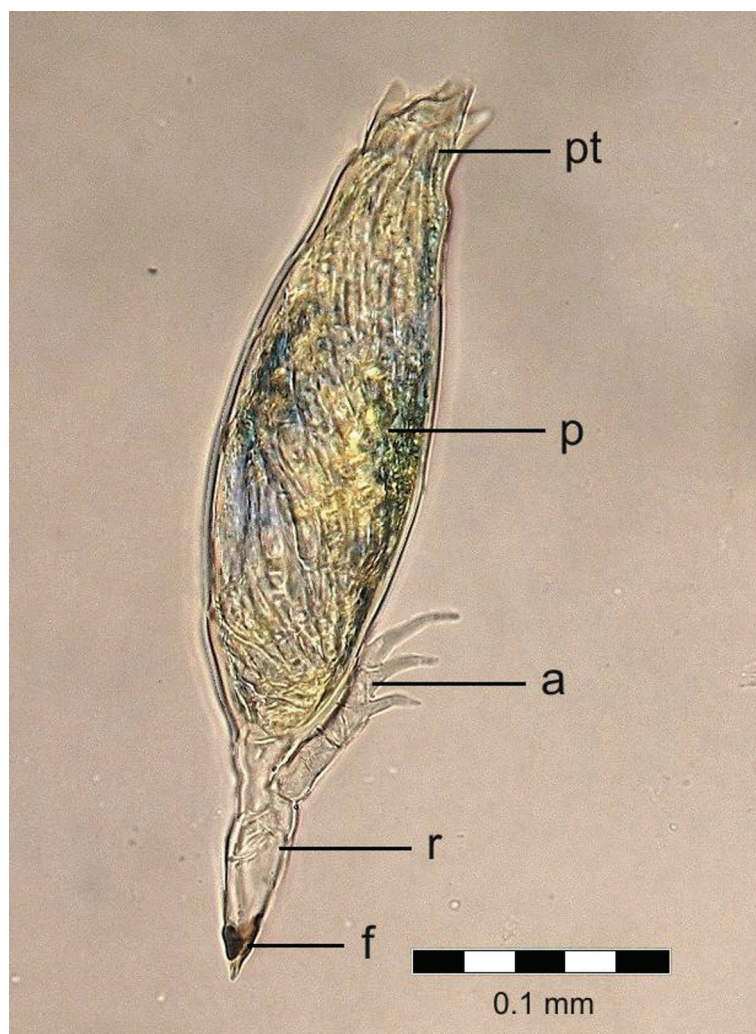


Fig. 2. A single thallus of *Hesperomyces coccinelloides*.

Abbreviations: f – foot, r – receptacle, a – appendage, p – perithecium, pt – perithecial tip.

Most records of *H. coccinelloides* come from tropical or subtropical localities (CERYNGIER et al. 2012). All the more northerly localities of the fungus, including Siskiyou County in California, USA (approximate latitude 41°30'N) (BENJAMIN 1989) and three European sites – Gualba in Spain (41°44'N) (SANTAMARIA 1995), Brussels in Belgium (50°52'N) (DE KESEL 2011) and the Polish locality reported in this paper (52°22'N) – are relatively recent. The last-mentioned one is the northernmost and easternmost, and hence experiences the most severe climate. We may thus hypothesize that, like *H. virescens*, *H. coccinelloides* is expanding its range towards colder areas. However, while it is suspected that the recent expansion of *H. virescens* is mainly mediated by its novel, highly suitable host, the invasive ladybird *Harmonia axyridis* (DE KESEL 2011), this is not the case with *H. coccinelloides*. The suspected range shift of this species may be at least partly attributable to climate change, as has been the case with many other species from various taxonomic and trophic groups (PARMESAN 2006).

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