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# The coccinellid parasite *Hesperomyces virescens* and further species of the order Laboulbeniales (Ascomycotina) new to Austria

Erhard Christian*

**Abstract**

The two-spot ladybird *Adalia bipunctata* is the only known host of the sexually transmitted fungus *Hesperomyces virescens* in Austria. Three further insect ecto-parasites of the order Laboulbeniales are recorded for the first time in Austria: *Laboulbenia notiophili*, *Stigmatomyces majewskii* and *Stigmatomyces scaptomyzae*.

**Key words:** *Hesperomyces*, *Laboulbenia*, *Stigmatomyces*, Coccinellidae, new record, Austria.

**Zusammenfassung**

In Österreich ist nur der Zweipunkt-Marienkäfer *Adalia bipunctata* als Wirt des sexuell übertragenen Pilzes *Hesperomyces virescens* nachgewiesen. Drei weitere Insekten-Ektoparasiten der Ordnung Laboulbeniales werden erstmals aus Österreich gemeldet: *Laboulbenia notiophili*, *Stigmatomyces majewskii* und *Stigmatomyces scaptomyzae*.

## Introduction

In spring 1999 I collected, on a loggia in the built-up area of Vienna, a two-spot ladybird with strikingly furred elytra. The greenish fur turned out to be a mass development of the fungus of the order Laboulbeniales, *Hesperomyces virescens*. Another coccinellid parasite came to light when I lifted the beetle´s wings: Acari of the family Podapolipidae, attached to the inner surface of the elytra. By picking up a single common beetle on my doorstep, I had happened to detect both a fungus and a mite species new to Austria. First records of three further Laboulbeniales, also made unintentionally, suggest that insect-associated organisms are still a good prospect for biodiversity research.

## Material and methods

Coccinellidae were collected in Vienna and examined for *Hesperomyces virescens* (only species with > 30 specimens mentioned): *Exochomus quadripustulatus* (L.), *Hippodamia variegata* (GOEZE, 1777), *Aphidecta obliterata* (L.), *Adalia bipunctata* (L.), *Coccinella septempunctata* L., *Harmonia quadripunctata* (PONTOPPIDAN, 1763), *Calvia*

* Dr. Erhard Christian, Institute of Zoology, University of Agricultural Sciences, Gregor-Mendel-Straße 33, A-1180 Wien, Austria. E-mail: echrist@edv1.boku.ac.at

*quatuordecimguttata* (L.), *Propylea quatuordecimpunctata* (L.), *Tytthaspis sedecimpunctata* (L., 1761), *Psyllobora vigintiduopunctata* (L.), *Epilachna argus* (GEOFFROY, 1762) and *Subcoccinella vigintiquatuorpunctata* (L.). Three other species of Laboulbeniales were recorded in the course of entomological studies. Infested parts of the hosts were preserved in 70% ethanol. Single thalli were cleared in Marc André I liquid and mounted on slides in Marc André II. Voucher material is deposited in the Naturhistorisches Museum Wien and in the collection W. Rossi, L´Aquila, Italy (*Stigmatomyces*).

## Results and discussion

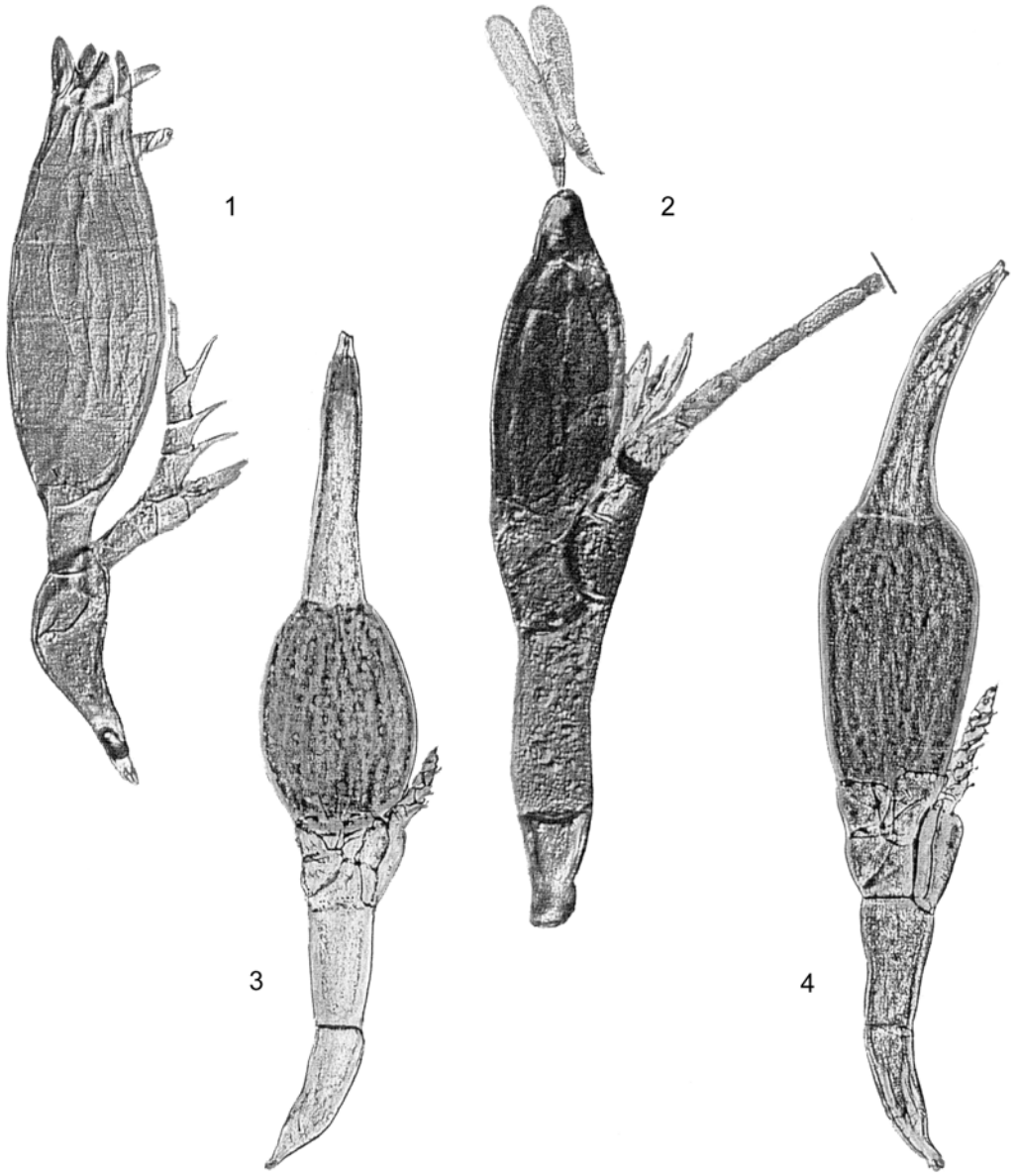
### *Hesperomyces virescens* THAXTER, 1891 (Laboulbenieae, Stigmatomycetinae)

The developmental morphology of *H. virescens* has been thoroughly described and illustrated by WEIR & BEAKES (1996). Fig. 1 gives a picture of a near mature thallus. Clearly visible are the foot with the melanized holdfast, the male appendage with outwardly directed antheridia, and the big bottle-shaped perithecium with characteristic apical lips (upper pair not yet fully developed). Between these lips the perithecium will open for the discharge of two-celled ascospores (compare Fig. 2). The trichogyne, discernible as a tubular structure below the lips, has aided transfer of spermatia at an earlier stage when the tip of the perithecium had reached the level of the antheridia. Self-fertilization seems to be common in this species (WEIR & BEAKES 1996).

Published records of *H. virescens* indicate a vast area of distribution: California, southeast USA, Haïti, Jamaica, Amazonia, Argentinia, United Kingdom, France, Spain, Morocco, Israel, Sarawak, Fiji. Species of six coccinellid genera are reported as hosts: *Chilocorus*, *Hippodamia*, *Adalia*, *Cycloneda*, *Eriopis* and *Psyllobora* (TAVARES 1985, SANTAMARIA et al. 1991).

In Vienna, *H. virescens* was recorded exclusively on *Adalia bipunctata* (leg. & det. E. Christian; localities: Vienna XV [= 15$^{th}$ district], Storchengasse, on a loggia, 31. 03. 1999; – XVIII, Türkenschanzpark, under *Platanus* bark, 04. 11. 1999; – XV, Sechshauser Park, under *Platanus* bark, 06. 02. 2000; – XI, Neugebäude Castle, on bushes, 23. 04. 2000; – XII, Dunklergasse, on bushes, 12. 07. 2001). Thalli were observed on the pronotum, the legs and the sternites of the beetles, but most densely on the elytra, especially near the outer edge of the distal half. *Aphidecta obliterata* and *Harmonia quadripunctata* were free of fungi even in an aggregation with hibernating *A. bipunctata* (Türkenschanzpark). In this sample 4 of 14 two-spot ladybirds were parasitized by *H. virescens*. WEIR & BEAKES (1996) found a similar prevalence (18 of 70 hibernating *A. bipunctata* parasitized) in the Kew Gardens, London.

*H. virescens* has been shown to develop a proper haustorial apparatus (KAMBUROV et al. 1967). Like most (or perhaps all) Laboulbeniales, the fungus is not a harmless epizoic organism, but draws nutrients from its insect host via penetrating rhizoids. Thus, the dynamics of the host population may be influenced. As there is every reason to assume that *H. virescens* is transferred mainly during copulation (WELCH et al. 2001), it can be considered as causing a sexually transmitted disease of ladybirds. Under these circumstances the survival of the parasite population depends on overlapping host generations and intergenerational matings of promiscuous beetles. Among central European




Figs. 1 - 4: Thalli of Laboulbeniales new to Austria. 1: *Hesperomyces virescens* from *Adalia bipunctata* (Coccinellidae); thallus length (t. l.) 210 µm; 2: *Laboulbenia notiophili* from *Notiophilus biguttatus* (Carabidae), discharging a pair of bicellular ascospores; t. l. 205 µm; 3: *Stigmatomyces majewskii* from *Drosophila obscura* (Drosophilidae); t. l. 370 µm; 4: *Stigmatomyces scaptomyzae* from *Scaptomyza pallida* (Drosophilidae); t. l. 325 µm.

Coccinellidae *A. bipunctata* is the species that meets this requirement best (HODEK & HONĚK 1996; KLAUSNITZER & KLAUSNITZER 1997). *H. virescens* is currently the subject of more detailed epidemiological investigations (WELCH et al. 2001).

### *Laboulbenia notiophili* Cépède & Picard, 1908 (Laboulbeniinae)

*L. notiophili* (Fig. 2) is associated with various species of the genus *Notiophilus* (Carabidae) over a large part of Europe: Norway, Finland, Great Britain, Poland, Romania, Hungary, Germany, Switzerland, France, Spain and Portugal (Santamaria et al. 1991; Weir 1996; Santamaria 1998). The fungus was recorded on *Notiophilus biguttatus* (Fabricius, 1779) from the garden of the University of Agricultural Sciences, Vienna XVIII, 11. 04. 2000 (leg. & det. E. Christian).

### *Stigmatomyces majewskii* Dainat, Manier & Balazuc, 1974 (Stigmatomycetinae)

*Stigmatomyces* species are parasites of Diptera. *S. majewskii* (Fig. 3) is obviously restricted to Drosophilidae. After the original description from France (on *Drosophila obscura* Fallén, 1823 and *D. subobscura* Collin, 1936) no further records have come to my attention. The fungus was found on bait-trapped drosophilids in the course of an urban ecological investigation (Gross 1992): Vienna XIV, Kolbeterberg, on *D. obscura*, 25. 06. 1990; – Vienna II, Prater, on *D. rufifrons* Loew, 1873, 24. 08. 1990 (leg. H. Gross, det. W. Rossi). Austrian specimens differ from the original diagnosis in the lower number of antheridia: 7 - 8 vs. 9 - 13.

### *Stigmatomyces scaptomyzae* Thaxter, 1901 (Stigmatomycetinae)

*S. scaptomyzae* (Fig. 4) lives on species of another drosophilid genus, *Scaptomyza*. It has been recorded in Finland, Poland, France and Italy, but also in Africa and the Americas (Santamaria et al. 1991). Austrian records (det. W. Rossi) are mentioned in an unpublished diploma thesis (Gross 1992): Burgenland, region of lake Neusiedlersee, on *S. pallida* (Zetterstedt, 1847), July 1990 (leg. K. Gaiser), and on *S. graminum* (Fallén, 1823), October 1990 (leg. B. Löffler).

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