

## ***Liotryphon punctulatus* (Ratzeburg, 1848) (Hymenoptera: Ichneumonidae) – a parasitoid of *Ephestia kuehniella* larvae**

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### Abstract

Until now, there has been no record of *Liotryphon punctulatus* (Hymenoptera: Ichneumonidae) presence in the anthropogenic environment of mills, bakeries or pasta factories. This is the first report of the species parasitizing *Ephestia kuehniella* (Lepidoptera: Pyralidae) larvae. The host/parasitoid interaction was validated under laboratory conditions where fourth or fifth instar larvae of *Ephestia kuehniella* were provided *ad libitum* to *L. punctulatus* females. After two filial generations emergence, the validation process was considered to confirm the interaction.

Keywords: *Liotryphon punctulatus*, Parasitoid, *Ephestia kuehniella*

### 1. Introduction

The Mediterranean flour moth, *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae) is a cosmopolitan pest of cereal products and other stored foods. Larvae spin a web in flour, grain, or seeds, causing problems in milling or sorting. Until now, three species of parasitoids were known to attack *E. kuehniella* larvae in anthropogenic environments: *Bracon brevicornis* Wesmael, 1838, *Habrobracon hebetor* Say, 1836 (Hymenoptera: Braconidae) and *Venturia canescens* (Gravenhorst, 1829) (Hymenoptera: Ichneumonidae) (Schöller and Flinn, 2000). Of these, *H. hebetor* is used in some European countries for biological control against *E. kuehniella* (Schöller, 2001).

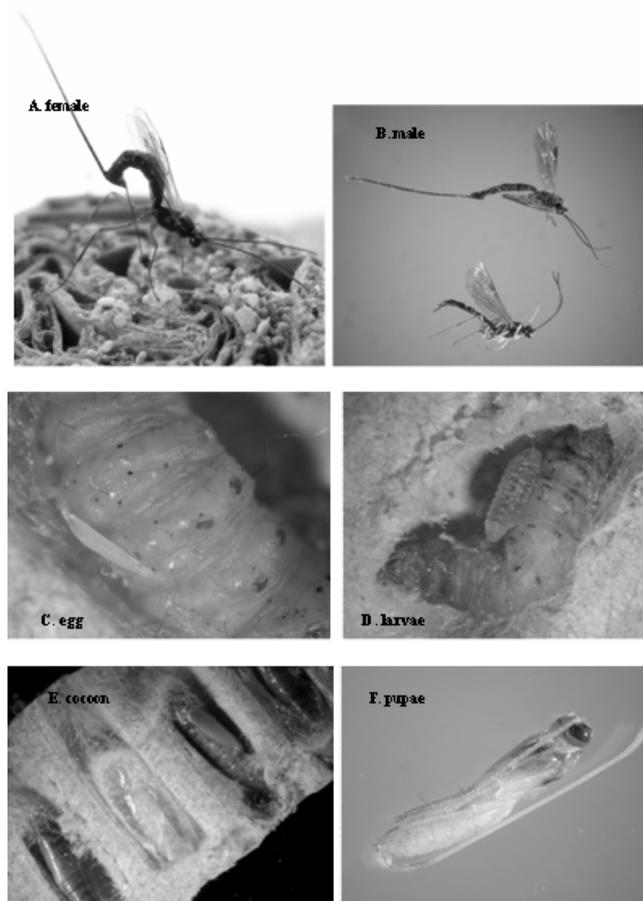
### 2. Materials and methods

Larvae of the Mediterranean flour moth search actively for crevices where remains of flour accumulate. Sentinel traps baited with third to fifth instar larvae of *E. kuehniella* were exposed to parasitization inside of mills, bakeries and pasta factories in the Czech Republic (locality of Prague, Kladno, České Budějovice, Plzeň, Prostějov) from the spring of 2002 until the autumn of 2007. Based on previous experiences, the traps were placed near windows, as parasitoids are attracted there by light. The traps were replaced every 20 d. After their removal, traps were placed into plastic boxes to control and record parasitoid emergence.

### 3. Results and discussion

Unknown specimens was found among individuals of *H. hebetor* and *V. canescens* repeatedly during the late spring months in every year of the study. Both males and females emerged from the sentinel traps. The unknown species was identified by Josef Šedivý as *Liotryphon punctulatus* (Ratzeburg) (Hymenoptera: Ichneumonidae) (Fig. 1) and placed in the insect collection of the Research Institute of Crop Production, Prague.

The host/parasitoid interaction was validated under laboratory conditions where fourth or fifth instar larvae of *E. kuehniella* were provided *ad libitum* to *L. punctulatus* females. After two filial generation emergences, the validation process confirmed the interaction.



**Figure 1** *Liotryphon punctulatus* life cycle (A. female and male, B. egg laying, C. egg, D. larvae, E. cocoon, F. pupae)

The biology of *L. punctulatus* is rather fragmentary (Lyngnes, 1960; Kühlnhorn, 1964; Kazakova, 1971). *Liotryphon punctulatus* is an external solitary idiobiont parasitoid of cocooned larvae that actively search in cryptic habitats. It measures in size to 1.5 cm, the ovipositor somewhat longer. The period elapsing between emergence and first oviposition is 10-19 d at 25°C and 20-30 d at outdoor temperatures during the early part of the year (Rosenberg, 1934). Eggs that are deposited during the latter portion of the oviposition period of the female were consistently different from those first laid, being markedly wider in relation to the length. A portion of the eggs of this species are devoid of contents when laid, and the number of these is greater after a period of rapid oviposition and during the latter portion of the oviposition period. Many adult female ichneumonids feed on the body fluids of the host stages that they parasitize; this is either incidental to oviposition or entirely independent of it. The feeding may have no relation to oviposition, and the punctures are often enlarged by use of the mandibles. Not only the fluids but the entire body contents may be consumed; and the feeding habit, instead of being incidental to, and associated with oviposition, has developed into a distinctly predaceous habit, independent of the reproductive activities, though very probably essential to oögenesis (Clausen, 1962). The adult parasitoid paralyzes and oviposits on its host, upon which the parasitoid larva feeds. After feeding externally on the host larva and killing it, the fully developed parasite larva spins a cocoon inside the host cocoon and emerges afterwards (or overwinters as a diapausing larva). Medvedev (1981) reports *L. punctulatus* parasitizing the seciids *Pennisetia hylaeiformis* (Laspeyres, 1801), *Synanthedon culiciformis* (L., 1758), *Synanthedon myopaeformis* (Borkhausen, 1789), *Synanthedon spheciformis* (Denis and Schiffermüller,

1775), *Synanthedon tipuliformis* (Clerck, 1759), and the tortricids *Archips oporana* (L., 1758), *Cydia pactolana* (Zeller, 1840), *Cydia pomonella* (L., 1758) and *Retinia resinella* (L., 1758).

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