

# HYPOPI OF MITES (*ACARINA*) PHORETIC ON EARWIGS, *FORFICULA AURICULARIA* L. (*INSECTA, DERMAPTERA*), COLLECTED FROM BEEHIVES

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## INTRODUCTION

European earwig, *Forficula auricularia* L. (Pl. I) belongs to commonly known insects often occurring in apary environment. Earwigs as polyphagous animals feed food of plant and animal origin. In beehives and their surroundings they prey on various small arthropods living in this environment. They fed also dead bees, food scraps, provisions of hosts and hive products (bee-bread, honey, pollen). They conduct active, usually night mode of life and penetrate beehives, pollen traps and their surroundings looking for food. While during the day they hide in crevices, especially under flight boards, pollen traps, roofs of hives and quilts, on the ceiling boards; they occur often inside left honeycomb cells free of bees. Investigations conducted on entomofauna of beehives and hive products show that earwigs are almost constant invaders of bees and their habitats (Chmielewski 1992, 1996, 2001-2005).

There are also some data on phoretic associations of mites inhabiting together with these insects (Behara 1950, Chmielewski 1977a,b, 1984, 2009). During examinations of hives and their surroundings a lot of observed earwigs were infested with numerous mites attached to insect's body surfaces.

Results of these observations were encouragement to undertake the studies on phoretic relations of these groups of arthropods and their significance for spreading of mites.

## MATERIAL AND METHODS

Total 15 samples of adult earwigs were collected from 12 beehives (*Apis mellifera* L.) and their surroundings of private, stationary apary localized in Puławy region (south-east Poland), during three seasons, summer and autumn months (June – November, 2004-2006).

The area included orchards, forest, meadow and agricultural cultivars. Collected earwigs were examined for external mites using a stereoscopic microscope. If necessary both insects and mites were kept in a refrigerator (temperature at below 0°C) prior to examination.

Numbers were counted after removal. Lactic acid (50%) was used to fix large numbers for routine examination and sorting. Both, air dried and 75% alcohol fixed material, were used for Scanning Electron Microscopy.

For the purposes of identification, mites were mounted in Oudemans' fluid (as recommended in Hughes 1976) on microscope slides. They were identified using the standard works of reference.

Mites were recorded for prevalence and for intensity on insects.

## RESULTS

A total number of 211 imagines of European earwig, *F. auricularia* were collected from beehives of *A. mellifera*. Those included all specimens separated from 15 samples (at average 14 (1-28) earwigs per sample) of material.

Acarological analyses shown that all of collected samples were containing earwig specimens settled with mites. Percentage of insects infested with mites in particular samples was ranged from 37.5 to 100%. Total infestation of this material was 81.5% of earwigs infested mainly with phoretic forms (hypopodes) of mites, but 18.5% were found to be free of them. Total number of 1440 mite specimens were isolated from the body surface of insects. Average number of mites was 8.4 per one earwig specimen, varied enormously and ranged from single to 85 hypopi or extremely even over 100 individuals.

The following external mites as phoretants were found on the body surface of earwigs: *Anoetoidea* (mainly fam. *Histiostomatidae*), e.g. *Histiostoma polyzori* (Oudemans), ca. 80% of earwigs were infested with hypopi of this species; ca. 20% of examined earwigs were settled with *H. ferontiarum* (Dufour), *Histiostoma* sp., *Myiameles* sp. and several *Acaroidea* (fam. *Acaridae*) – *Acarus farris* Oudemans, *Rhizoglyphus echinopus* Fumouze et Robin, *Caloglyphus berlesii* (Michael), *Calvolia* sp. Some other unidentified mites, belonging mainly to trombiculids (parasitic larvae) and mesostigmatid groups (*Trombidiformes*, *Mesostigmata*), were rare or sporadically recorded and usually in small numbers only.

The adaptations of hypopodes for life on the surface of insect's body includes reduced mouth parts (gnathosoma), strong suckers localized on sucker plates and tarsi, presence of tactile, tarsal setae and sensilla, strong sclerotized body cuticle, small size and dorsal-ventrally flattened body shape.

Attachment of mites on particular regions of the body surfaces of insects was very characteristic. The most numerous hypopi colonies were observed on the front, end and lateral surfaces of thorax. Abdomen was settled mainly

in the neighbourhood of thorax, and also in its distal part, near abdominal end (cerci) (Pl. II-VI).

Hypopodes attached to earwig legs (coxa, femur) were also sometimes observed and rather rare on its head (eyes). Smooth and unprotected body surfaces, distal body parts, especially mobile segments of legs (tarsi) and head (mouth parts, antennae), were usually free of mites.

## DISCUSSION AND CONCLUSIONS

Results obtained during present investigations of species composition, abundance and prevalence of mites associated with earwigs show, that majority of them are phoretic on their hosts.

Microscopic analyses of acarological material collected from insects give evidence that they are representatives of *Anoetoidea* and *Acaroidea* superfamilies (hypopodes forms), mainly belonging to families *Histiostomatidae* and *Acaridae*. Of them *H. polyzori* (hypopi) seems to be dominating species, phoretic on insects in question.

Other anoetoids and acaroids were not so numerous and rather rarely observed. Also trombiculids (parasitic larvae of *Trombiculidae*) and mesostigmatids (*Mesostigmata*) occurred usually as single specimens; sporadic occurrence of representatives of this last group seems to be accidental phenomenon.

Presented results are evidence of significant part of earwigs in the mite – insect relations, which are very important in transportation and spreading of mites in apary environment penetrated with these animals.

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## Pl. I – *Forficula auricularia* L.



## Pl. II-VI

