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COMMUNITY STRUCTURE OF MITES (ACARI: ACARIFORMES AND PARASITIFORMES) IN NESTS OF THE SEMI-COLLARED FLYCATCHER (*FICEDULA SEMITORQUATA*)

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ABSTRACT: *The aims of the present paper are to establish the specific structure of communities of prostigmatic and mesostigmatic mites in nests of the semi-collared flycatcher (Ficedula semitorquata) and to compare the fauna with the mites in nests of two other European flycatchers. For analysis of community structure of mites were used the indices: prevalence, relative density, mean intensity and dominance. Mite communities are strongly dominated by the species Dermanyssus gallinae and Ornithonyssus sylviarum, which were found with the highest frequency and dominance. The mite communities are characterized by a large number of subrecedent species.*

KEYWORDS: Acariformes, Parasitiformes, Nest of Bird, Community Structure

INTRODUCTION

The nests of different species of birds are an example of a fairly unstable and isolated habitat, with its own dependent on it specific fauna which involves different groups of invertebrate animals. One of the components of this fauna which demonstrates particular abundance is the arthropods, and more specifically, the mites. The studies of Parasitiformes show that mesostigmatic mites living in birds' nests vary both in terms of their species affiliation and the structure of their communities [4, 8]. Highly important with respect to veterinary science and medicine are a number of species, such as *Ornithonyssus bursa, Ornithonyssus sylviarum, Dermanyssus gallinae* harboured by birds, *Ornithonyssus bacoti*, harboured by rodents, etc. They are blood sucking mites, which during migration periods attack humans as well, causing itching, scabies, dermatitis, and some allergies, such as bronchial asthma and allergic rhinitis. A number of species from the Cheyletidae family (Prostigmata) are mainly linked with the nests of vertebrate animals, and probably in the second place, with granaries, domestic dust and other sinatropic habitats [5]. Among parasitic cheyletids there are ectoparasites of wild and domestic animals, some of which are also harboured by man and cause skin diseases [2, 6].

The aims of the present paper are to establish the structure of communities of mites in nests of semi-collared flycatcher and to compare the fauna with the mites in nests of two other European flycaters. The present work is a series of author’s publications about mite fauna inhabiting the nests of *Ficedula semitorquata* in Bulgaria.

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MATERIAL AND METHODS

The study was conducted in 2012 and focused on the fauna of mites living in the nests of semi-coloured flycatcher in the area of Kamchia mountain (North-East Bulgaria), (N 42°55'10,11'' E 27°48'56,08''). The birds' habitat is the woodland area covered with oak and beech trees only or a mixture of deciduous species, dominated by *Quercus cerris, Quercus frainetto, Quercus dalechampii, Fagus orientalis, Fagus sylvatica, Tilia tomentosa*.

For the purposes of the study 200 artificial nest boxes were placed. 74 of those nests belonged to the semi-coloured flycatchers and it was in them that the material for the study was collected. Collected nests were placed in polyethylene bags with labels indicating the place and the date of collection, and were taken to the laboratory for a consequent treatment. The isolation of ectoparasites living in the birds' nests was done by means of Tulgren's funell and by hand with the help of a stereomicroscope. Collected specimens were preserved in 70% alcohol. Temporary microscope samples were prepared in lactophenol in order to identify the species.

For analysis of community structure of mites were used the following indices (according to Margolis et al.) [14]: prevalence (P%) (percentage of nests in which the species occurred); relative density (R) (ratio of the number of specimens of every species to the number of all nests); mean intensity (I) (ratio of the number of specimens of every species to the number of nests, in which the species was found) and dominance (D%) (ratio of the number of specimens of every species to the number of all the specimens, in percent). According to their dominance the species were divided into 5 groups: eudominant (> 10%); dominant (5 – 10%); subdominant (1 – 5%); recedent (0. 5 – 1%), and subrecedent (< 0. 5%).

RESULTS

A total of nine species of mites belonging to orders Mesostigmata and Prostigmata were established in the semi-collared flycatcher nests.

Prevalence of found species varies from 1.35% to 82.43% (Fig. 1). The species *D. gallinae* (82.43%), had the highest prevalence – it was found in 61 out of 74 studied nests. Considerably high prevalence had the species *O. sylviarum* (50%), found in 37 out of 74 nests. Least frequently found were the species *Dermanyssus hirundinis, Androlaelaps fahrenholzi, Myonyssus gigas, Cheyletus malaccensis* and *Eucheyletia bakeri* (with 1.35% prevalence each). The species *Androlaelaps casalis* and *Hypoaspis heselhausi* took an intermediate position with prevalence of 5.41 % and 2.70% each.

The analysis of the dominant structure of mite communities showed the following results: Two species belonging to the group of eudominants were found to have the largest number of specimens: *O. sylviarum* (with dominance 43.38%) and *D. gallinae* (55.25%). One species – *A. casalis* (0.79%) - belongs to the group of the recedents. The largest number – 6 - is that of subrecedents. They include: *D. hirundinis* (0.21%), *H. heselhausi* (0.12%), *A. fahrenholzi* (0.08%), *C. mallacensis* (0.08%), *M. gigas* (0.04%) and *E. bakeri* (0.04%). The species with the smallest number of specimens found in the studied nests include: *M. gigas* and *E. bakeri* (1specimen in one of the nests) and *A. fahrenholzi* and *C. malaccensis* (with 2 specimens in one of the nests). There were 5 specimens of the species *D. hirundinis* in one of the nests, 1 specimen of the species *H. heselhausi* in one of the nests, and 2 specimens of the same

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species in another nest. No species belonging to the groups of dominants and subdominants were found (Fig. 1).

Analysis of the relative density showed that the species which are eudominants have the highest relative density. They included *O. sylviarum* and *D. gallinae* (Fig. 1). Unlike them, there were 4 species with approximately equal values for relative density – *A. fahrenholzi* and *C. malaccensis* with relative density of 0.03. *M. gigas* and *E. bakeri* have a relative density of 0.01, but differ in their degree of dominance.

The mean intensity of the identified species varies from 1 to 28.24. *M. gigas* and *E. bakeri* have the lowest mean intensity – 1, whereas *O. sylviarum* is characterised by the highest mean intensity – 28.24.

DISSCUSION

The obtained results show that the fauna of mites in the nests of semi-collared flycatcher is dominated by species *D. gallinae* and *O. sylviarum*, established with the highest prevalence, dominance, relative density and mean intensity. They are blood-sucking ectoparasites, obligatory parasites of birds. In the surveyed nests the largest is the number of subrecedent species - 6. To this group belong ectoparasites mainly on small mammals or free-living predators, which were established not only with a small number of specimens, but extremely rare. The our results agree with observations of other authors who indicated that the main elements of nesting fauna of birds are of accidental origin and the presence of these species is not related to the particular host [1, 9, 10, 11, 12, 16]. These mites could have been brought into the nests together with the nest constructing material, with food for the nestlings or in case of contact of some small mammals with the nests of birds.

Our previous study on the mite fauna in the nests of semi-collared flycatcher showed that with the greatest number of specimens and most frequent was only *O. sylviarum* [3]. It was found in three of the surveyed 7 nests (prevalence 42.9%). To this species belong 91.4% of all specimens found in the nests and it was eudominant.

So far, the mite fauna in the nests of Semi-collared flycatcher in other countries in Europe has not been studied. However there is information on mesostigmatic mites in nests of two other European flycatchers. Ambros et al. [1] recorded 4 gamasid mites in nest boxes of *F. albicollis* in Slovakia – *Eulaelaps stabularis*, *Hypoaspis praesternalis*, *Androlaelaps casalis*, *Pergamasus crassipes*. The authors indicated that the most frequent and with the highest number of specimens is *A. casalis*, while the other species were found with a single specimens.

Investigating the soil arthropod fauna in the nests of different bird species in Slovakia, Fend'a *et al*. [7] established four mite species in five nests of *Ficedula albicolis – Hypoaspis lubrica, Proctolaelaps pygmaeus, Ameroseius plumea, Trichouropoda orbicularis, Nenteria breviunguiculata*. Madej and Stañska [13] found 11 mite species in 20 nests of collared flycatcher (*F. albicollis*) and pied

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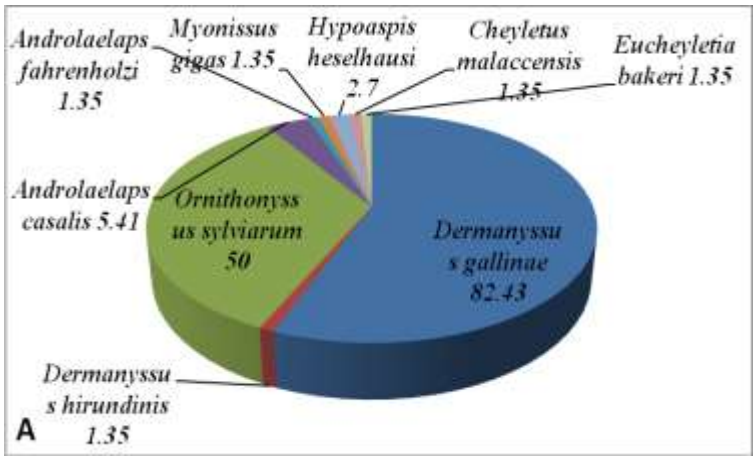

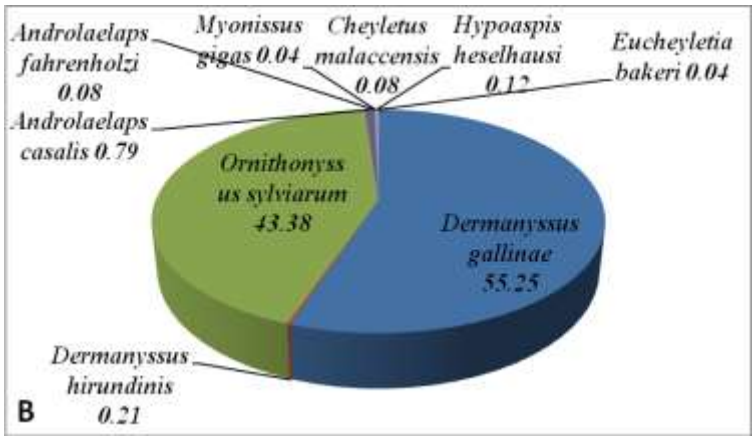

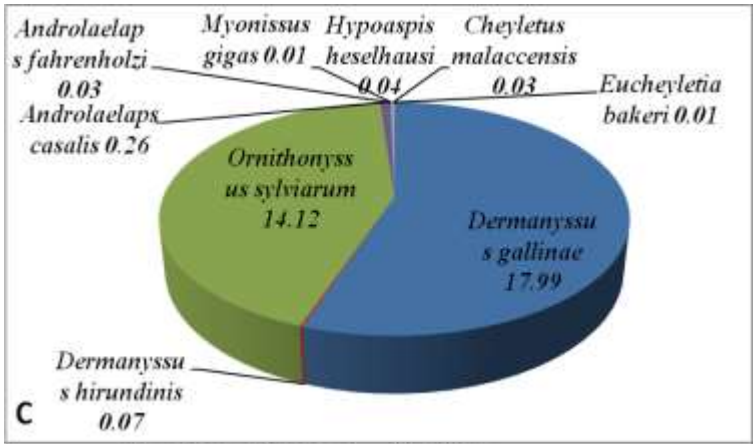

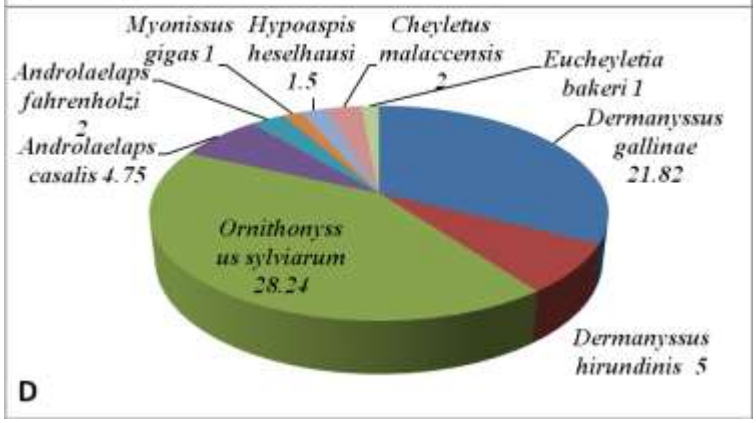

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Figure 1. *Prevalence (A), dominance (B), relative density (C) and mean intensity (D) of the mite species in the nests of semi-coloured flycatcher.*

Flycatcher (*F. hypoleuca*) in Poland - *Lasioseius ometes, Asca nova, Proctolaelaps pygmaeus, Androlaelaps casalis* (the most frequent), *Detmanyssus gallinae* (the most numerous species), *Hypoaspis lubrica, Gamasellodes bicolor, Geholaspis longispinosus, Pergamasus quisquiliarum, Porrhostaspis lunulata, Zercon curiosus*. Later Švaňa et al. [15] analyzed the mites of the Mesostigmata in the nests of bird species in Slovakia and found only two species in the nests of *F. albicollis – Androlaelaps casalis* and *Dermanyssus hirundinis*.

Our results and the analysis of the species established by other authors indicate that the mite fauna in the nests of different European flycatchers is varied, both in terms of the taxonomic composition and in terms of the degree of contamination from different species. We note some common features, namely the presence of *Androlaelaps casalis* - a typical nesting predator in four of the five analyzed studies. In all studies, the major part of the species belonged to the groups of free-living predators or ectoparasites in mammals. The reasons for the observed differences are probably geographic distribution of species or differences in the collection of nests. We should not ignore the fact that studies have been made in a large span of time.

CONCLUSIONS

Mite communities in the nests of semi-collared flycatcher are strongly dominated by the species *D. gallinae* and *O. sylviarum*, which were found with the highest prevalence, dominance, relative density and mean intensity. The other found species - *D. hirundinis, A. fahrenholzi, A. casalis, H. heselhausi, M. gigas, C. malaccensis* and *E. bakeri* were established with small number of specimens and rare.

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