

Arthropods in the nests of the Common Kestrel (*Falco tinnunculus*) Článkonožce v hniezdach sokola myšiara (*Falco tinnunculus*)

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Abstract: In 2008 we analyzed nest material from 25 nests of the Common Kestrel nesting in the residential and rural areas of Bratislava. 4486 arthropod individuals were determined, belonging to the orders Coleoptera, Mesostigmata, Prostigmata, Astigmata, Oribatida, Diptera and Siphonaptera. The arthropod fauna in the nests of the Common Kestrel can be classified into 4 groups: mites, dipteran larvae, adult beetles and dipterans. Three families of avian ectoparasites were present, comprising 26% of the total arthropod abundance. The remaining 74% of arthropod abundance in the nests comprised coprophagous and nidicolous species.

Abstrakt: Počas roku 2008 sme analyzovali hniezdny materiál z 25 hniezd sokola myšiara hniezdiaceho v intraviláne a extraviláne Bratislavy. Determinovaných bolo 4486 jedincov článkonožcov z radov Coleoptera, Mesostigmata, Prostigmata, Astigmata, Oribatida, Diptera a Siphonaptera. Faunu článkonožcov v hniezdach sokola myšiara môžeme rozdeliť na 4 skupiny: roztoče, larvy dvojkridlovcov, imága chrobákov a dvojkridlovcov. Ektoparazity vtákov boli zastúpené 3 čeľad'ami a predstavujú 26 % abundancie článkonožcov v hniezdach, zvyšných 74 % tvoria koprofágne a nidikolné druhy.

Key words: Common Kestrel, nest fauna, ectoparasites, coprophagous, nidicolous, Bratislava, South Slovakia

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Introduction

The Common Kestrel (*Falco tinnunculus* L., 1758) is one of the most common raptors in Slovakia (Danko et al. 2002). It inhabits a broad range of habitats from high mountains to lowlands and it has been able to successfully adapt to the living conditions of urban environments (Glutz et al. 1971). Therefore the Common Kestrel is suitable as a model species for the study of different aspects of nesting biology including the parasitic or non-parasitic nest fauna. The basic summary of the Common Kestrel parasite fauna from the Czechoslovakia was published by Hudec & Šťastný (2005). Piechocki (1991) in his monograph on this species states that current knowledge of the parasite fauna of the Common Kestrel is limited and

this species is known to be parasitized most frequently by some species of the order Mallophaga. Chewing lice of the *Laemobothrium* genus and *Degeefiella rufa* species have been found on nestlings. Parasitization of nestlings by chewing lice can sometimes be fatal (Kübler et al. 2005). Besides parasitic insect species, there are some sapro- or coprophagous species which often occur in the nests. Raptor nests are known to be suitable habitats for some species of beetles (e.g. Hågvar 1975). However, a detailed synopsis of the Common Kestrel nest arthropod fauna had not been published. The main aim of this work is to study the species composition, abundance and frequency of arthropods in the nests of the Common Kestrel in Slovakia

Materials and methods

Material of bird nest fauna was extracted from the nest lining of the Common Kestrel in the residential and rural areas of Bratislava. A sample of 200–300 g was taken from each nest for examination. In total 25 nests were collected during the 2008 nesting season. The material was collected from different types of nests in the territory of Bratislava: artificial nests (11 cases), half-open nesting box (1), magpie nests (2), cavities in different buildings (4). In the residential part of Bratislava, 7 nests in flower pots or ventilation shafts were examined. Nest material was collected during the nesting season in April, May, June and after the fledging. After being collected from the field, the material was kept and transported in polythene bags.

Tullgren extractors with a 40W light bulb as the effective source of light and heat were used for at least 48 hours. The extractor works on the principle that animals escape from the nesting material in response to light and heat, they cross a mesh and fall into a container with a fixation liquid (ethanol solution; Southwood 1978). Finally, small pieces of detritus from the nest are examined under a stereomicroscope. The extracted specimens were preserved in ethylalcohol 75% solution and determined to species level. Individual specimens of the parasitic dipteran *Carnus hemapterus* were collected directly from the nestlings using a hand aspirator. Immediately after the extraction, the specimens were preserved in ethylalcohol 75% solution. Juvenile Kestrels were weighted and tarsus length was measured to calculate their age (Voříšek & Lacina 1998).

Results and discussion

In 25 nests of the Common Kestrel we determined 4486 individuals of arthropods from the orders Coleoptera, Mesostigmata, Prostigmata, Astigmata, Oribatida, Diptera and Siphonaptera (Fig. 1). The synopsis of all arthropod species and their abundance in the residential and rural areas of Bratislava can be found in Table 1. The arthropod fauna found in the nests of the Common Kestrel can be classified into 4 groups. Mites ($n = 1409$), dipteran larvae ($n = 2482$), adult beetles ($n = 213$) and adult dipterans ($n = 382$). Avian ectoparasites of 3 different families were found, and their abundance can be seen in Fig. 2. Ectoparasitic mites of the genera *Dermanyssus*, *Eulaelaps* and *Androlaelaps* were found. The most frequent mites in the nests belong to the genera *Laelaps* and *Dermanyssus*. The obligate ectoparasites of birds include the species *Dermanyssus gallinae* and *Dermanyssus hirundinis* (Karg 1993). Ectoparasitic Diptera of the species *Carnus*

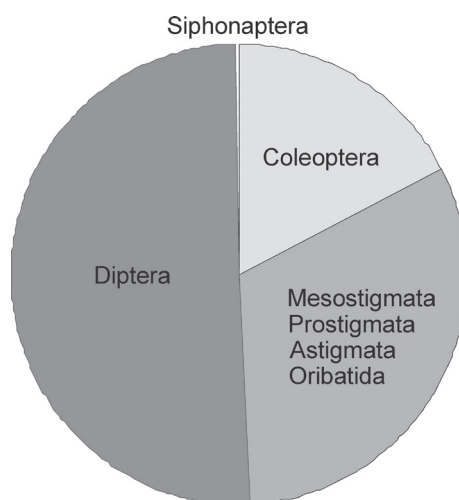


Fig. 1. Abundance of individual arthropod groups in the nests.
Obr. 1. Abundancia skupín článkonožcov v hniezdach.

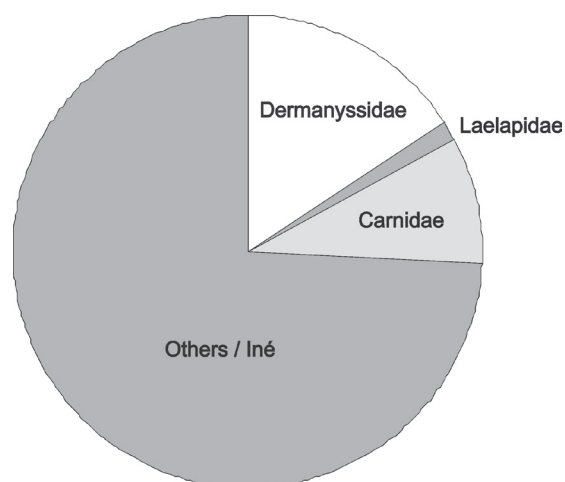


Fig. 2. Abundance of bird ectoparasites in the nests.
Obr. 2. Abundancia ektoparazitov vtákov v hniezdach.

hemapterus were also found on the nestlings (Grimaldi 1997). Larvae of this species are known to develop in the nesting material, but we did not confirm their presence. Adults of *Carnus hemipterus* were found in 10 nests and altogether 37 nestlings were infested and they were found to parasitize Kestrel nestlings from day 2 to 17 after hatching. Nestlings younger than 2 days ($n = 3$) and aged between 29 and 36 days ($n = 2$) had no parasites. Altogether we found 176 males and 235 females of *Carnus hemapterus*.

Tab. 1. Synopsis of the arthropod species and their frequency of occurrence in the nests of the Common Kestrel (*Falco tinnunculus*). n – number of taxons (e – rural areas, i – residential areas), F – proportion of nests with the presence of the taxon, n [nests] – number of nests with the presence of the taxon

Tab. 1. Prehľad jednotlivých druhov článkonožcov a frekvencia ich výskytu v hniezdach sokola myšiara (*Falco tinnunculus*). n – počet taxónov (e – extravilán, i – intravilán), F – podiel hniezd s výskytom príslušného taxónu, n [nests] – počet hniezd s výskytom príslušného taxónu

taxon / taxón		n	n	F	n
		[e]	[i]	[%]	[nests]
Prostigmata non.det.			1	4.0	1
Astigmata non.det.		34	224	68.0	17
Oribatida non.det.		24	140	72.0	18
Ascidae non.det.			6	12.0	3
Parasitidae non.det.			1	4.0	1
Parasitidae			1	4.0	1
Laelapidae non.det.		9	15	24.0	6
Laelaps sp.		10	31	32.0	8
Laelaps hilaris (C. L. Koch, 1836)			16	4.0	1
Laelapidae			1	4.0	1
Eulaelaps stabularis (C. L. Koch, 1840)			1	4.0	1
Androlaelaps sp.		4	23	16.0	4
Androlaelaps casalis (Berlese, 1887)			27	20.0	5
Androlaelaps fahrenheitsi (Berlese, 1911)		11	6	24.0	6
Mesostigmata					
Macrochelidae non.det.		43	8	16.0	4
Macrochelidae					
Macrocheles glaber (J. Müller, 1860)		51	2	8.0	2
Dermanyssidae non.det.		1	28	28.0	7
Dermanyssidae					
Dermanyssus gallinae (de Geer, 1778)		2	3	12.0	3
Dermanyssus hirundinis (Hermann, 1804)		2	672	28.0	7
Uropodidae non.det.		2		4.0	1
Urodinychidae			3	12.0	3
Uroobovella sp.			3	12.0	3
Polyaspididae			2	8.0	2
Uroseius infirmus (Berlese, 1887)			2	8.0	2
Trachytidae			1	4.0	1
Trachytes irenae Pecina, 1970			1	4.0	1
Nenteriididae			1	4.0	1
Nenteria dobrogensis Feider & Hutu, 1971			1	4.0	1
Nenteria breviunguiculata (Willmann, 1949)			3	8.0	2
Zerconidae			1	4.0	1
Zercon peltatus C.L. Koch, 1836			1	4.0	1
Carnidae		2	382	44.0	11
Carnus hemapterus Nitzsch, 1818			2	382	44.0
Diptera					
Calliphoridae non. det.		166	873	68.0	17
Muscidae non. det.		78	107	24.0	6
Fanniidae non. det.		623	22	28.0	7
Siphonaptera					
Ctenophthalmidae					
Ctenophthalmus assimilis (Taschenberg, 1880)		1	2	12.0	3
Ctenophthalmus assimilis assimilis (Taschenberg, 1880)			2	4.0	1
Ceratomyzidae					
Ceratomyza pullata Jordan et Rothschild, 1920		1	5	16.0	4
Ceratomyzidae					
Ceratomyza tribulis Jordan, 1926			1	4.0	1
Dasypsyllidae					
Dasypsyllus gallinulae (Dale, 1878)		1		4.0	1
Siphonaptera non. det.			3	8.0	2
Histeridae					
Carcinops pumilio (Erichson, 1834)			22	32.0	8
Gnathoncus buyssoni (Auzat, 1917)			10	12.0	3
Trogidae					
Trox scaber (Linnaeus, 1767)			47	16.0	4
Coleoptera					
Dermestidae non.det.					
Dermestes frischeri Kugelann, 1792			3	8.0	2
Dermestidae					
Anthrenus fuscus Olivier, 1789		19		8.0	2
Anthrenus pimpinellae Fabricius, 1775			3	4.0	1
Tenebrionidae					
Uloma rufa (Piller & Mitterpacher, 1783)			95	8.0	2
Coleoptera non. det.		5	605	48.0	12

The rest of the nest fauna (74%) comprised mainly rodent ectoparasites. Mesostigmate mites of the family Laelapidae (Karg 1993) and Siphonapterans of the families Ctenophthalmidae and Ceratophyllidae (Rosický 1957) were found, which were most probably carried to the nests on the prey – rodents (Hudec & Šťastný 2005). Some coprophagous and nidicolous species of beetles and flies were also found.

Nest fauna of the Common Kestrel in the residential and rural areas of Bratislava comprised non-parasitic coprophagous and nidicolous arthropods (74%) and avian ectoparasites (26%). Ectoparasitic species of the families Dermanyssidae, Laelapidae and Carnidae were found. Mites of the families Dermanyssidae and Laelapidae are harmful for birds because of the irritation and disturbance they cause through repeated sucking, leading to the overall exhaustion of their bird hosts. In some areas they are known to act as the vectors of various diseases of domestic animals such as the avian spirochetosis (Volf et al. 2007). Abundance of these mite species in the nests of the Common Kestrel was rather low (Tab. 1). The only exception was a single artificial nest, where 634 individuals of the *Dermanyssus hirundinis* species were found. The nest was examined on 22 May 2008 and 2 eggs of the Common Kestrel were recorded. Under the nest, castings and feathers of the Long-eared Owl (*Asio otus* Linnaeus, 1758) were found, leading us to the conclusion that the owl nested here prior to the Kestrels. After the next examination (27 May 2008) the nest was already abandoned. We suppose that the outbreak of mites in the nest after it was left by the Long-eared Owls may have caused its subsequent abandonment by Kestrels. The other significant ectoparasite we found was the *Carnus hemapterus* species. Dawson and Bortolotti (1997) found in the American Kestrel (*Falco sparverius*) that nestlings were infested from the first to the 25th day of life, while the prevalence of the *Carnus hemapterus* species decreased with increasing age of the nestlings. Nestlings aged between 0–5 days (40–50% of nestlings) and 6–12 days (25–30% of nestlings) were most infested. In contrast to expectations, authors did not record increased mortality of nestlings caused by this ectoparasite, nor any influence on the length of the flight feathers, hematocrit levels or concentration of blood plasma proteins in nestlings that reached the age of 24 days. Birds of prey nests present a suitable habitat for different non-parasitic species. The insect fauna inhabiting nests of the Saker Falcon (*Falco cherrug*) was described by Merkl et al. (2004). They determined 8 beetle species belonging to 4 families. Their findings support the presence of nidicolous species or

species feeding off cadavers and faeces. This was also confirmed by the species composition of beetles in the nests of the Common Kestrels nesting in Slovakia. An important component of the nest fauna comprised dipteran larvae of the families Calliphoridae, Muscidae and Fanniidae. Although we did not observe the presence of haematophagous larvae (e.g. genus *Protocalliphora* from the Calliphoridae family; Bennett & Whitworth 1992) the observed larvae may be able to cause myiasis or serve as vectors for a number of pathogen organisms, including various helminth eggs and cysts of different protozoans (Volf et al. 2007).

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