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Contribution to the knowledge on the synanthropization and dietary specialization of the Ural Owl (*Strix uralensis*) in urban environment of Košice city (East Slovakia)

Príspevok k poznatkom o synantropizácii a potravnej špecializácii sovy dlhochvostej (*Strix uralensis*) v mestskom prostredí Košíc (východné Slovensko)

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Abstract: *S. uralensis* is a typical silvatic species, specialized for this life style through its biology and diet. Synanthropization is a rare phenomenon in this species, reflected in the changes of diet and hunting strategies, adapting to the characteristics of the urban environment. Between November 22, 1993 and June 2, 1994, an individual of the Ural Owl was observed 39 times in the urban areas of Košice city. The examination of the pellets revealed that the Ural Owl specialized in hunting *Streptopelia decaocto* (76.7%) and *Columba livia* f. *domestica* (13.4%). These results were confirmed by observations of *S. uralensis* hunting *S. decaocto*. This discovery is the first direct evidence of *S. uralensis* diet adaptation to *S. decaocto* and feral *C. livia* f. *domestica* in Slovakia.

Abstrakt: *S. uralensis* je typickým obyvateľom lesov, k čomu je prispôsobená aj jeho biológia a potravné zloženie. Proces synantropizácie u tohto druhu je výnimočným javom, s čím súvisí aj zmena jeho potravy a spôsob lovu vzhľadom na špecifické mestské prostredie. V čase od 22. 11. 1993 do 2. 6. 1994 v mestskom prostredí mesta Košice bol pozorovaný jeden ex. 39 krát. Analýza vývržkov potvrdila v tomto prípade potravnú špecializáciu *S. uralensis* na *Streptopelia decaocto* (76,7 %) a *Columba livia* f. *domestica* (13,4 %). Výsledky sa potvrdili aj priamymi pozorovaniami, kedy *S. uralensis* ulovili jedince *S. decaocto*. Toto zistenie predstavuje prvý doklad potravnej špecializácie *S. uralensis* na *S. decaocto* a mestské holuby na Slovensku.

Key words: urban habitat, Eurasian Collared Dove, *Streptopelia decaocto*, diet, urbanization

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Introduction

The Ural Owl is a common inhabitant of the forest habitats in the eastern parts of Slovakia, comprising approximately 1000 breeding pairs. The western boundary of its range is extending much further than supposed in the past and reaches beyond Slovakia into the Moravian-Silesian Beskids (Danko et al. 2002). The Ural Owl is a resident species, migrating to lowland areas only during harsh winters. This species inhabits broad-leaved, mixed and rarely also coniferous forests in the Carpathian Mountains. In the years of overbreeding, the winter range of our population is expanding. Along with the invasions from the North, the expansion accounts for ever more frequent winter sightings of the Ural Owl in the Slovak lowlands (Danube and East-Slovak lowlands) or in rural and urban areas of villages and larger towns (Mošanský, Hudec, Matoušek, Šťastný in Hudec 1983). The knowledge on the distribution of *S. uralensis* in the town of Košice and its surroundings was summarized by Mošanský & Sládek (1958) and Mošanský (1979, 1991). Mošanský (1991) regards *S. uralensis* as a regular breeder in the habitats of the Košice forest park in Črmeľská valley. The Ural Owl is resident in this area and leaves the breeding site only during very harsh winters. Even in such conditions



Fig. 1. Occurrence of the Ural Owl (*Strix uralensis*) in the centre of Košice town (red circle). Črmeľ and Furča – forest units with confirmed regular nesting of the Ural Owl.
Obr. 1. Výskyt sov dlhochvostých (*Strix uralensis*) v centre mesta Košice (červený krúžok). Črmeľ a Furča – lesné celky so zaznamenaným pravidelným hniezdením.

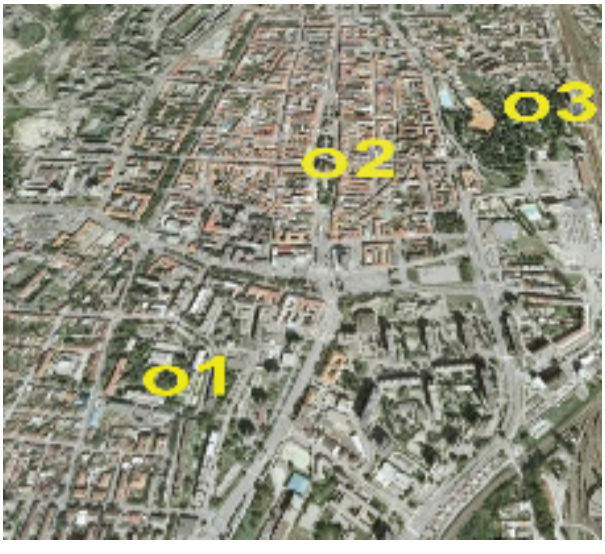


Fig. 2. The habitat with observed occurrence of the Ural Owl (*Strix uralensis*) in the centre of Košice town (o1 – observed area, o2 – historical centre, o3 – Petrov park.
Obr. 2. Prostredie pozorovania sov dlhochvostých (*Strix uralensis*) v centre mesta Košice (o1 – sledovaný areál, o2 – historické centrum, o3 – Petrovov park).

the Ural Owl does not fly far away, but only seeks out lower areas in the surroundings of the nesting site. In such conditions, the Ural Owl has been killed on March 3, 1865 in a garden in the suburbs of Košice (Mošanský 1991). The occurrence of *S. uralensis* in the centre of Košice is shortly mentioned by Dravecký (2004). Adaptation of birds to the anthropic environment and synanthropization of birds in Košice has been described by Mošanský (1979, 1982, 1991), in Bratislava Darolová (1989, 1992), Feriancová-Masárová & Kalivodová (2001), in Piešťany Salaj (1981), Kaňuščák (1988) and Kočí (2008). Synanthropization has been observed both in birds and mammals (Gaisler 1963, Horáček & Zima 1979, Johnston & Janiga 1999, Tichonova et al. 2002, Baker & Harris 2007, Ortega-Alvarez & MacGregor-Fors 2009).

The diet of the Ural Owl in Slovakia has been described by Sládek (1962), Adamec et al. (2003) and Obuch (2005). However, specialization for the hunting of prey in the urban setting has not been documented such in Slovakia as in other countries (Mysterud & Hagen 1969, Mikkola 1983, Czuchnowski 1997, Vrezec 2001, Sidorovich et al. 2003, Kloubec et al. 2005). This article focuses on the first known occurrence of synanthropic *S. uralensis* in the urban agglomeration of Košice in relation to the known nesting sites in the proximal forest parks in Črmeľ and Furča neighbourhood units (Fig. 1). This article describes the presence of the Ural Owl in the centre of Košice and its dietary specialization to the synanthropic bird species including mainly *Streptopelia decaocto*.

Materials and Methods

S. uralensis was recorded in the centre of Košice city (East Slovakia; 235 thousands of inhabitants) DFS 7293 and 7393 (Databank of Slovak Fauna – mapping grid squares sized 10 minutes of longitude × 6 minutes of latitude, i.e. approximately 12.2 × 11.1 km, ca. 135 km^2), geographic position 48° 43´ N 21° 15´ E, altitude 208 m asl. The very place of observation of the Ural Owl was located in the area of former Military veterinary institute in Košice, which can be entered from the Kukučínova and Zborovská streets. The 4 ha large area is covered with 130 old broad-leaved trees including 70 ind. *Aesculus hippocastanum*, app. 40 ind. *Tilia platyphyllos* and 10 ind. *Acer platanoides*. Around the southern face of the main building there are 6–8 individuals of 8–10 m tall *Thuja occidentalis*. The area is positioned approximately 500 m from the historical core of the town, surrounded by large blocks of flats, old historical buildings gradually passing into the residential area with family houses in the direction towards the main public cemetery and University hospital

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on the Rastislavova street. The observed area is situated close to the main road junction in the centre of the city at the shoping centre Dargov and is characterized by dense traffic and electrical network, frequent traffic of cars, public busses, trolley busses and trams. (Fig. 2).

In the period between November 22, 1993 and June 2, 1994, *S. uralensis* were observed in this habitat for a total of 320 hours. From November 22, 1993 the Ural Owls were deliberately searched for daily between 7:00 a. m. and 4:00 p. m., conducting several surveys a day. The observed individuals had stable roosting places, used for several days in a row, or alternating. Pellets were collected under the roosts after the observation. The remains of prey could be found including feather balls, tail feathers as well as other parts of fresh bodies of the *S. decaocto* and *C. livia* f. *domestica*. During the observation period, 16 compact pellets were found. The preserved pellets were 6,0–10,0 cm long and 2,0–3,0 cm thick and contained large bones (Fig. 3). The examination of the pellets and the species determination in the prey was performed by the second author of this contribution. The results were analyzed according to Obuch (2001). The article also summarizes observations of *S. uralensis* in the centre of Košice by other researchers.

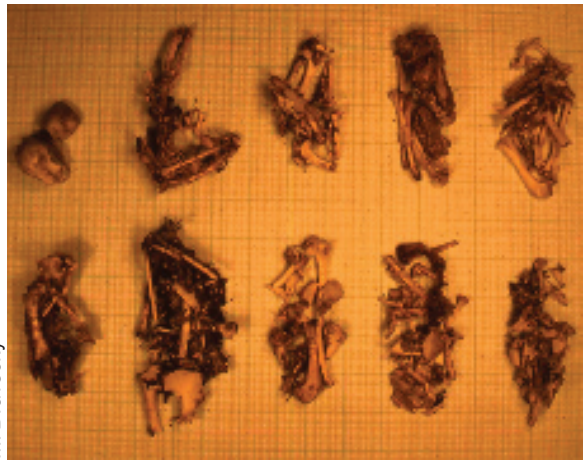

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Fig. 3. Pellets of the Ural Owl (*Strix uralensis*) with bone remains of the Collared Dove (*Streptopelia decaocto*). 2 June 1994.
Obr. 3. Vývržky sovy dlhochvostej (*Strix uralensis*) s kostrovými zbytkami hrdličiek záhradných (*Streptopelia decaocto*). 2. 6. 1994.

Results and Discussion

In the years 1993 and 1994, *S. uralensis* owls were sighted 39 times in the observed area, including 5 cases when 2 individuals were observed together. The highest number of observations was recorded in January (20.5%), February (15.4%) and March (17.9%). The number of occurrences during the typical breeding season (Hudec 1983) in May (23.1%) was surprisingly high. The number of observations in November, December, April and June was lower, generally under 8%. A single individual of the Ural Owl was observed 21 times at its roosting place (53.7%), which indicates that this individual had a preferantial place of spending its daily rest (Fig. 4). This was also confirmed by the selection of the second site where this individual was observed 9 times (23.1%). In two cases *S. uralensis* were sitting on human constructions, such as on a metal gutter and on a rung of a metal ladder at the level of the second floor under the roof. Direct observations of *S. uralensis* in the Košice city centre were reported by several local ornithologists. Lipták (in verb.) observed 1 ind. on August 18, 1984 at 6:00 a. m. roosting on an *A. hippocastanum* in the Tomášikova street. A single hunting individual was observed by Reistetter (in verb.) on November 27, 1993 between the tree tops at 10:00 p. m. in the Jesenná street. On January 27, 1994 1 ind. chased songbirds in the centre of Košice in the Hrnčiarska street in the vicinity of Katova bašta. The owl flied over to a large willow in the centre of a yard and later at 4:40 p. m. leaved in the direction towards the Petrov park (Pačenovský, in verb.). On February 3, 1994 an adult individual of the Ural Owl was observed on the roof of a block of flats on the trolley bus terminal stop on the Furča neighbourhood unit by Lipták (in verb.). In the same year Mihók (in verb.) observed a fatal collision of an adult Ural Owl into the window of a block of flats. In the beginning of 2003 Lipták (in verb.) took into rehabilitation an injured individual found by the guard at the Traffic College on Moldavská street in Košice. In the same year an adult female was found, rehabilitated and released in the Popradská street (Lipták in verb.). The presented evidence indicates that observations of *S. uralensis* in the centre of Košice have become more frequent in the past 10–15 years than in earlier times. This suggests that this owl species may adapt its typical diet to the urban habitats, which present a very unusual environment for such an exclusively silvatic species as *S. uralensis*. Our observations lead us to the following conclusions:

1. *S. uralensis* occur in the urban setting of Košice even in the most frequent parts of the city. In most cases the Ural Owls were associated with locations characterized by the presence of old trees with extensive canopy such as horse chestnuts, maples, lindens, that can be found in parks, cemeteries and alleys. We found



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Fig. 4. The Ural Owl (*Strix uralensis*) at the location of its most frequent occurrence in the centre of Košice, 18 January 1994.
Obr. 4. Sova dlhochvostá (*Strix uralensis*) na mieste najčastejšieho výskytu v meste Košice, 18. 1. 1994.

out *S. uralensis* owls roosted and rested in buildings, roofs and technical constructions too.

2. The occurrence of *S. uralensis* in the Košice downtown is not associated exclusively with winter period, but also spring and summer months (March, April, May, June).
3. In most cases *S. uralensis* owls were observed when resting during the day on a selected roost in the tree canopy almost without any movement until dusk. The individuals observed in the area hunted their prey in the early morning hours or at dusk. They were not observed hunting during the day. The prey captured in the morning was held in the claws during the day for an extensive period of time.
4. Considering the number of observations we can conclude that the occurrence of *S. uralensis* owls in Košice town has become more frequent during the last 10–15 years, although many individuals escape our attention during passive roosting during the day in the tree canopy. The owls probably select several suitable locations for their living in the urban environment. When accidentaly disturbed they move between these locations even during the day. This can explain the observation of *S. uralensis* leaving the area during the day, as well as sightings of an adult individual entering the habitat and staying at the site until dusk.
5. *S. uralensis* shows decreased vigilance against passing pedestrians in comparison with owls living in the natural silvatic habitats. The observed individual would not leave its roost even though people were passing only 5 m away from the lowest branches of the horse-chestnut tree it regularly roosted on. Some individuals did not react to the disturbance such as the presence of passing pedestrians, noise made by heavy machinery, jackhammers, cars etc.
6. Further evidence of *S. uralensis* synanthropization was found in the dietary specialization of this owl species for hunting *S. decaocto* and less frequently also the predation of the feral form of *C. livia* f. *domestica*, which are typical species of the urban environment. The examination of 16 pellets and other observations, the remains of *S. decaocto* were found in 76.7% and *C. livia* f. *domestica* in 13.4% (Tab. 1). *S. uralensis* were twice observed hunting *S. decaocto* on the tree, where groups of doves of 5–15 inds. gathered for night roosting. The *S. uralensis* strategy for hunting *S. decaocto* was very simple and highly efficient. Dietary specialization of *S. uralensis* for *S. decaocto* is closely associated with the synanthropization of this species and it is the first evidence of such behaviour in this species in Slovakia.

The knowledge about the occurrence of *S. uralensis* in Košice and its surroundings was summarized by Mošanský & Sládek (1958) and Mošanský (1979, 1991). Between 1944–1955 (X.–II. months) the occurrence of the Ural Owl was reported from 17 individuals shot in the surroundings of Košice. The locations of the shots included Košice rural area (12×), Košice city (3×), Košice-Črmeľ (1×) and 1× on March 1, 1945 directly in the centre of the town in the Petrov park. No more recent observations of the *S. uralensis* were reported by Mošanský in the town centre before 1990. From another cities in Europe only a few occurence of *S.uralensis* have been reported. In 1907 1 ex. have been shot in city park of Sofia (Bulgaria) and another one have been seen in 2008 in Upsala sity (Sweden). Authors of this article presented a total of 46 observations from 1993 (1× in 1984)

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Tab. 1. Diet composition of the Ural Owl (*Strix uralensis*) in the centre of Košice city
Tab. 1. Potrava sovy dlhochvostej (*Strix uralensis*) z centra mesta Košice

		pellets / vývržky									
sample / vzorka	prey / korisť	premaxilla	mandibula	humerus		metacarpus		tarsometatarsus		∑[1]	%
				L	R	L	R	L	R		
1.	*Streptopelia decaocto*	3	3							3	
2.	*Streptopelia decaocto*			1		1	1			1	
	Columba livia dom.							1		1	
3.	*Streptopelia decaocto*			1	1	1	1			1	
4.	*Streptopelia decaocto*	1	1		1		1			1	
5.	*Streptopelia decaocto*			1	1	1	1	2	1	2	
6.	*Columba livia dom.*			1	1	1	1			1	
7.	*Streptopelia decaocto*			1	1	1	1			1	
8.	*Streptopelia decaocto*		1				2	1		2	
	Carduelis chloris	1	1					1		1	
9.	*Streptopelia decaocto*			1		1	1		1	1	
10.	*Streptopelia decaocto*			1		1	1		1	1	
11.	*Streptopelia decaocto*			1						1	
12.	*Streptopelia decaocto*							1	1	1	
13.	*Streptopelia decaocto*	1			1	1		1		1	
14.	*Streptopelia decaocto*		1	1		1				1	
15.	*Streptopelia decaocto*				1	1		1		1	
16.	*Streptopelia decaocto*			2	1				1	2	
	Columba livia dom.			1						1	

		other records / ďalšie záznamy				
		whole individium / celý jedinec[2]	leg and feathers / noha a perie [3]	tail / chvost [3]	wing / krídlo [3]	
17.	*Turdus merula*		1			1
18.	*Columba livia dom.*			1		1
19.	*Streptopelia decaocto*				1	1
20.	*Streptopelia decaocto*	1				1
21.	*Streptopelia decaocto*	1				1
22.	small Passeriformes	1				1
∑	**Aves**					**30**
	Streptopelia decaocto					**23**
	Columba livia dom.					**4**
	Turdus merula					**1**
	Carduelis chloris					**1**
	small Passeriformes					**1**

100.0	
76.7	
13.4	
3.0	
3.0	
3.0	

Explanations / vysvetlivky: L – left / ľavý, R – right / pravý; [1] number of individuals / počet jedincov; [2] prey kept by Ural Owl in its bill or talons / korisť držaná sovou dlhochvostou v zobáku alebo drápoch; [3] fresh prey remains found on the ground under the place on tree with sitting Ural Owls / čerstvé zbytky koristi nájdené na zemi pod sediacimi sovami dlhochvostými

of this owl species directly in the urban environment. Although *S. uralensis* is a conspicuous species and often escapes our attention, even more frequent occurrence could be anticipated during the last 10–15 years in the residential areas of the Košice town. The probability of *S. uralensis* occurrence in these locations increases through the proximal movement of breeding pairs to the suburban neighbourhoods as could be confirmed at the urban unit Furča. Mihók installed 6 nesting boxes in the Furča forest park belonging to the urban unit Košice III. In 1999 all of these nesting boxes were occupied and 2 other pairs of the Ural Owl used nests of the birds of prey for nesting. The total density of breeding pairs at this 5 square kilometer area is 1 pair / 0.6 km^2 of forest. 4 pairs were nesting in an area of 750×550 m and the closest distance between the nests was 200 m (Danko

Tab. 2. Comparison of the abundance of the Columbidae in the diet of *S. uralensis* with past records
Tab. 2. Porovnanie zastúpenia Columbidae s literárnymi údajmi o potrave *S. uralensis*

sites / lokality **prey / korisť**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**∑**	**%**
Columba livia domestica	4		1						5	0.20
Columba palumbus		1			3	3			7	0.29
Streptopelia decaocto	3+ 23	2- 0				1- 0			23	0.94
Streptopelia turtur					1				1	0.04
Mammalia	**3- 0**	**762**	**185**	**162**	**347**	**416**	**137**	**68**	**2077**	**84.98**
Aves	**2+ 30**	**97**	**26**	**2- 3**	**40**	**38**	**1- 8**	**8**	**250**	**10.23**
Amphibia, Reptilia, Pisces	**0**	**23**	**4**	**3**	**1+ 17**	**1- 2**	**1+ 11**	**0**	**60**	**2.45**
Evertebrata	**0**	**2- 2**	**2+ 26**	**5**	**8**	**2- 0**	**1+ 16**	**0**	**57**	**2.33**
∑	**30**	**884**	**241**	**173**	**412**	**456**	**172**	**76**	**2444**	**100.00**

Explanations / vysvetlivky: + significantly higher abundance / výrazne vyššie zastúpenie, - significantly lower abundance / výrazne nižšie zastúpenie (Obuch 2001); **1.** Košice, own data / vlastné údaje; **2.** Slovakia / Slovensko (Obuch 2005); **3.** Slovakia / Slovensko (Sládek 1962); **4.** Slovenia / Slovinsko, Ljubljansko barje (Vrezec 2001); **5.** Poland / Poľsko, Niepolomicky les (Czuchnowski 1997); **6.** Bohemia / Česko, Šumava (Kloubec et al. 2005); **7.** Germany, East Prussia / Nemecko, Východné Prusko (Uttendörfer 1939); **8.** Norway / Nórsko (Hagen 1989)

Tab. 3. Abundance of the Columbidae in the diet of Strigiformes in Slovakia (Obuch 2005)
Tab. 3. Zastúpenie Columbidae v potrave Strigiformes na Slovensku (Obuch 2005)

owl species / druh sovy **prey / korisť**	***Bbub***	***Talb***	***Aotu***	***Anoc***	***Gpas***	***Afun***	***Sura***	***Salu***	**∑**	**%**
Columba livia dom.	2+ 177	3- 5	4- 0					2- 11	193	0.10
Columba oenas	2+ 26	1- 0	1- 0					6	32	0.02
Columba palumbus	2+ 57	2- 0	2- 0				1	1- 5	63	0.03
Columba sp.	2+ 101	3- 0	3- 0					2- 9	110	0.06
Streptopelia decaocto	2+ 38	1- 4	1- 3					10	55	0.03
Streptopelia turtur	2+ 35	2- 0	2- 0					13	48	0.02
Aves	**1+ 4006**	**1- 1892**	**2- 768**	**1- 54**	**3+ 103**	**1- 110**	**1+ 97**	**1+ 3895**	**10925**	**5.57**
∑	**43155**	**45759**	**46843**	**2318**	**228**	**2670**	**884**	**54161**	**196018**	**100.00**

Explanations / vysvetlivky: + significantly higher abundance / výrazne vyššie zastúpenie, - significantly lower abundance / výrazne nižšie zastúpenie (Obuch 2001); ***Bbub*** – *Bubo bubo*, ***Talb*** – *Tyto alba*, ***Aotu*** – *Asio otus*, ***Anoc*** – *Athene noctua*, ***Gpas*** – *Glaucidium passerinum*, ***Afun*** – *Aegolius funereus*, ***Sura*** – *Strix uralensis*, ***Salu*** – *Strix aluco*

et al. 2002). It would be very interesting to find out, whether breeding pairs of *S. uralensis* nesting in the nest boxes in the Furča forest park fly to the urban areas for hunting synanthropic bird species such as *S. decaocto* and *C. livia* f. *domestica* and feed them to their offspring. The occurrence of *S. uralensis* in the city centre was evident through the finding of injured or deceased adult birds. These Ural Owls were injured in collisions with constructions such as windows of high buildings at residential communities and other residential units. The synanthropization is also evident through hunting prey in the streets of Košice, including several synanthropic songbird species: *Passer domesticus*, *Turdus merula* and *Carduelis chloris*. This could also be observed in the case of *S. uralensis* owl sighted by Pačenovský (in verb.) hunting close to Katova bašta, which is located in between the historical buildings with narrow paved streets in the close vicinity of the pedestrian zone of the historical centre of Košice.

The observed phenomenon of *S. uralensis* dietary specialization for the predation of *S. decaocto* is closely associated with the actual synanthropization and occupation of Košice by the Collared Dove. Mošanský (1991) regards the first summer appearance of *S. decaocto* in 1946 and first overwintering in 1947 as the beginning of occupation of Košice by this species. The rapid growth of *S. decaocto* population was documented by the results of Mošanský (1990), who showed that the population

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Tab. 4. Abundance of the Columbidae in the diet of Falconiformes and Accipitriformes in Slovakia
Tab. 4. Zastúpenie Columbidae v potrave Falconiformes and Accipitriformes na Slovensku

raptor species / druh dravca **prey / korisť**	***Ftin***	***Fper***	***Fche***	***Bbut***	***Agen***	***Apom***	***Ahel***	***Achr***	**∑**	**%**
Columba livia dom.	3- 14	1- 245	2+ 1022	5- 6	2+ 94	5- 4	5- 0	1- 20	1405	11.50
Columba oenas	5- 0	2+ 562	1+ 238	5- 1	2- 4	5- 1	5- 0	2- 6	812	6.65
Columba palumbus	4- 0	2+ 361	2- 27	4- 3	1- 3	3- 3	4- 0	9	406	3.32
Columba sp.	2- 0	4- 0	3- 0	2- 2		1- 7	3+ 110		119	0.97
Streptopelia decaocto		1- 1	5		2+ 13		1		20	0.16
Streptopelia turtur	3- 0	58	2+ 180	4- 0	2	4- 0	3- 0	3	243	1.99
Aves	**2- 158**	**1+ 3160**	**1+ 1952**	**3- 180**	**1+ 260**	**3- 102**	**1- 371**	**1- 147**	**6330**	**51.80**
∑	**1297**	**3309**	**2328**	**1864**	**282**	**1690**	**1086**	**363**	**12219**	**100.00**

Explanations / vysvetlivky: + significantly higher abundance / výrazne vyššie zastúpenie, - significantly lower abundance / výrazne nižšie zastúpenie (Obuch 2001); ***Ftin*** – *Falco tinnunculus* (Darolová 1989, Kečkéšová & Noga 2008); ***Fper*** – *Falco peregrinus*, old food/ stará potrava (Obuch 1996); ***Fche*** – *Falco cherrug* (Obuch & Chavko 1997); ***Bbut*** – *Buteo buteo* (Šotnár & Obuch 2009); ***Agen*** – *Accipiter gentilis* (Šotnár 2000); ***Apom*** – *Aquila pomarina* (Dravecký et al. 2008); ***Ahel*** – *Aquila heliaca* (Chavko et al. 2007); ***Achr*** – *Aquila chrysaetos* (Kadlečík et al. 1995)

in 1980/1981 at the night roosting place in the park of the University hospital at the Rastislav street reached over 5000 individuals. This intensive occupation of Košice by *S. decaocto* with rapid population growth, associated with old city parks created a stable source of readily available prey for birds of prey including the *S. uralensis*. The easily available source of prey influenced the dietary strategy and synanthropization of *S. uralensis* in the Košice city. This process is relatively recent with respect to the quite late occupation of Košice by *S. decaocto*.

When analyzing the food composition of the Ural Owl from different parts of Europe, several aspects become important: season of food composition data collection (breeding, off-breeding), pellet collection method (in the nests, nest boxes, in the surroundings of nests or off nests, from non-nesting individuals, stomach sample examination), habitat (silvatic or in extreme cases urban, as in this study), amount of collected and determined prey and period of food data collection. The general review of diet composition in the Ural Owl from different parts of Europe shows that the main component of its diet comprises mammals (especially *Microtus* spp), including mainly *Microtus agrestis* followed by *Arvicola terrestris*, *Myodes glareolus*, Soricidae ssp. and others (Korpimäki & Sulkava 1987) in the Northern Europe and *Microtus arvalis* (Vrezec 2001) in the Central Europe. Birds are considered to be a less important or alternative source of food during the years with low rodent populations. In Scandinavia, the diet was found to be composed of Mammalia (71.5%–97.7%) and Aves (2.3–25.1%) in an extensive sample of prey items of n = 10 479. This data came from different regions of Finland: Kauhava 84.8% / 9.9% and Keuruu 86.4% / 9.0% (Korpimäki & Sulkava 1987), from North Savo 97.7% / 2.3% (Jäderholm 1987) and from Päijät-Häme 71.5% / 25.1% (Kunttu 1978), from Sweden 88.1% / 8.4% (Lundberg 1981), Norway 85.0% / 15.0% (Mysterud & Hagen 1969) and Germany 78.9% / 7.4% (Schäfer & Finckenstein 1935). In the majority of the presented works, the diet was analyzed from silvatic habitats with natural occurrence and breeding of *S. uralensis*. The food items were collected from nests and nest boxes (pellets, remains of prey during nesting or after fledging). In rare cases the stomach content analysis was carried out (Sládek 1962) or collection of pellets in the winter season (Vrezec 2001). Any records of *S. uralensis* hunting in the urban environments or large cities are either absent, or only discussed through indirect evidence. Vrezec (2001) suggested that *S. uralensis* must have hunted in the vicinity of the human settlements as he found the remains of *Thuja* tree in a pellet along with remains of *Mus musculus* in the region of Ljubljansko barje in Slovenia. However our contribution provides direct evidence of the occurrence of *S. uralensis* and prey hunting in human settlements. The bird prey of *S. uralensis* in most cases comprised bird species living in silvatic environments or in open fields and meadows. There have been no records of the synanthropic *S. decaocto* in the diet of *S. uralensis*. The diet of *S. uralensis* in the centre of Košice comprised 100% birds including 76.7% *S. decaocto*. We consider this finding to be a unique case of dietary adaptation to the urban environment. This can be seen in the comparison of our material with other published

food spectra of *S. uralensis* (Tab. 2). According to other results, Columbidae are a rather rare prey of *S. uralensis*. Excluding our quite small sample, there are no significant differences in the ratio of mammals (85% on average) in the diet of the *S. uralensis*. The average contribution of birds to the diet of *S. uralensis* is about 10%, where the records from Slovenia and Eastern Prussia are markedly below the average. The material of 884 prey items of *S. uralensis* from the mountain areas of the Eastern and Central Slovakia included only 1 individual of Columbidae (*Columba palumbus* species) and birds (Aves) in total comprised only 11% of the diet. Our finding is exceptional also in comparison to food composition in other owl species (Tab. 3). In the comparison of diet composition of 8 owl species in the Slovak territory (Obuch 2005), Columbidae are one of the major components of diet only in the *Bubo bubo* species. *S. decaocto* comprises more than 0,03% of the diet in only 4 owl species including *B. bubo*, *Tyto alba*, *Asio otus* and *Strix aluco*. The most common Columbidae prey included *C. livia* f. *domestica* (0.10%). In the material of 196 018 prey items Aves comprise only 5.57%. Columbidae comprise a significant part of the diet in some bird of prey species, especially *Falco cherrug* and *Accipiter gentilis*. *C. livia* f *domestica* is the most frequently hunted species (11.50%) of Columbidae. *S. decaocto* (0.16%) is the least frequently hunted species from Columbidae, comprising a substantial part of the diet only in the *A. gentilis* (4.6%) (Tab. 4). *S. decaocto* spread in Slovakia during the 1950's and currently has become an abundant synanthropic bird species. The above mentioned analyses indicate that even after 50 years of its residence in Slovakia, no owl species has managed to adapt to the predation of this bird species. Our finding of *S. uralensis* hunting adaptation is yet unique. In the urban environment of smaller towns and villages, *T. alba* has been shown to hunt *P. domesticus* and *S. aluco* was observed hunting mainly *Turdus* spp. The domesticated subspecies *C. livia* f. *domestica* is most frequently hunted by the birds of prey such as *Falco peregrinus*, *F. cherrug*, *A. gentilis* and *B. bubo* as its only owl predator.

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