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Response of Birds and Mollusca to the Anthropic Interferences in the vicinity of the Airport Bratislava - Ivánka - Antropogén hatás madarakra és puhatestükre a Bratislava - ivánkai reptér közelében

In 1979-1986 we have studied the structure of ornithocoenoses in the vicinity of the airport Bratislava-Ivánka with respect to the negative effects of birds on the aeronautical operation. Because since 1981 the biotopes of the investigated area were influenced by works connected with the airport extension and the construction of a biological waste clarification plant we have followed the effects of these interferences on birds and molluscs. Both animal groups indicate changes in the environment caused by anthropic effects /FERIANCOVÁ-MASÁROVÁ, KALIVODOVÁ 1965, LI-SICKÝ 1973/. Except this we have studied the relationships between the birds and molluscs based on the trophic aspects at which the Mollusca representing the prey of the birds. The results of the field research have been compared with the data of other authors.

Methods

The birds were followed by common qualitative and quantitative ornithologic methods. On the lines leading through all types of biotypes each two-weeks observations were performed all the year round supplement with a stationary research on 8 areas of 1 hectare /Fig.1./ On the same places samples from an area of 1 m² of surface litter were taken. Within the whole investigated area /also except the lines and stationaries/ the shells of molluscs damaged by birds were taken. The birds were observed by a field glass when taking their food, and in the case of positive Mollusca collection they were disturbed so as to determine the species consumed. In 1986 we checked all places where the shells of Mollusca were found in the previous years, and the stationaries and lines were investigated in detail too.

On the territory investigated 45 species of Mollusca /Tab.1./ and 114 species of birds were found /52 of these were molluscivorous - Tab.2./. By immediate observation from a very narrow distance we have found that the following species of birds belonged to molluscivorous: *Ciconia ciconia* L., *Buteo buteo* L., *Falco tinnunculus* L., *Coturnix coturnix* L., *Phasianus colchicus* L., *Vanellus vanellus* L., *Numenius arquata* L., *Larus canus* L., *Larus ridibunda* L., *Columba palumbus* L., *Columba livia* f. domestica, *Streptopelia turtur* L., *Streptopelia decaocto* FRIV., *Oriolus oriolus* L., *Coryus corone* L., *Corvus frugilegus* L., *Corvus monedula* L., *Pica pica* L., *Garrulus glandarius* L., *Parus major* L., *Parus caeruleus* L., *Turdus viscivorus* L., *Turdus pilaris* L., *Turdus philomelos* BREHM, *Turdus merula* L., *Oenanthe oenanthe* L., *Saxicola rubetra* L., *Erythacus rubecula* L., *Sylvia communis* LATH., *Motacilla alba* L., *Passer domesticus* L., and *Emberiza citrinella* L. Also other works correspond with the results obtained by us /CREUTZ 1953, KEVE 1955, OPATRNY 1958, REKASI-RICHNOVSZKY 1974, FERIANC 1977, 1979, GROMADZKA, LUNIAK 1978, HUDEC et al. 1983/; they present Mollusca in the food of other 100 birds. Of these the following were recorded on the territory observed: *Anas platyrhynchos* L., *Anas querquedula* L., *Ixobrychus minutus* L., *Gallinula chloropus* L., *Fulica atra* L., *Actitis hypoleucos* L., *Cuculus canorus* L., *Athene noctua* SCOP., *Strix aluco* L., *Asio flammeus* PONTOPP., *Saxicola torquata* L., *Phoenicurus phoenicurus* L., *Luscinia megarhynchos* BREHM, *Acrocephalus arundinaceus* L., *Hippolais icterina* VIEILL., *Phylloscopus collybita* VIEILL., *Regulus regulus* L., *Sturnus vulgaris* L., *Emberiza hortulana* L., and *Embirizia schoeniculus* L. Of the above presented 52 molluscivorous species 32 were nesting. Most of them /39,2 %/ depended on the residues of forest growths /floodplain forests, trees and bushes at the stream of the Small Danube/. In this biotope accumulated shells of Mollusca were regularly found till 1983 at trunks and stones. On one place 40-60 crushed shells of *Cepaea vindobon.* /MÜLL. Fig.2./ and *Arianta arbustorum* /L. Fig.3./ were found. In agreement with the data of TURCEK /1954/ and GOODHARD /1958/ we have found that these artificial deposits of shells were made by *Turdus philomelos*. More amounts of the shells of the species of *Planorbarius corneus* /L./, *Planorbis planorbis* /L./, *Helicella obvia* /MENKE/, *Helix pomatia* L., *Cepaea vindobonensis* /FER./ and *Monachoides incarnata* /MULL./ were found in the night shelters of the pheasant /*Phasianus colchicus*/ and rooks /*Corvus frugilegus*/.

Except the above presented Mollusca, the birds collected also in the neighbourhood of the airport: Euomphalia stri-gella /DRAP./ and Lymnaea stagnalis /L./. Turdidae, Corvidae and starlings /Sturnus vulgaris/ were observed when collecting the shell-free species from the Limacidae and Arionidae Family. Because these residues by investigation of stomachs are difficult to distinguish they are not taken into consideration. J.OBUCH /in verb/ drew attention to the numerous occurrence of the dorsal plates of the owl /Strix aluco L./. He found out that the species of the Limacidae family can form as much as 30 % of the food for the Tawny owl.

Conclusion

Intensive anthropic interferences /changes in the structure of vegetation, backfilling and drying of water localities/ in the neighbourhood of the Bratislava airport resulted in making the landscape steppe-wiese, and negative impacts on both groups of the animal were observed. The changes were as follows:

1. The quantity was reduced and the character of the occurrence /temporary occurrence instead breeding/ was changed in 16 species of the birds /Phasianus colchicus, Gallinula chloropus, Columba palumbus, Streptopelia turtur, Athene noctua, Oriolus oriolus, Corvus corone, Parus major, Parus caeruleus, Turdus philomelos, Turdus merula, Saxicola rubetra, Saxicola torquata, Luscinia megarhynchos, Erythacus rubecula, Hippolais icterina/.
2. The quantity of Mollusca decreased significantly in the first and second ecological group /forest species and mostly forest species/
3. Of hygrophilous and aquatic Mollusca 8 species disappeared /Vallonia enniensis, Lithoglyphus naticoides, Anodonta anatina, Viviparus acerosus, Planorbis planorbis, Anisus spirorbis, Gyraulus laevis, Physa acuta.
4. Since 1984 /in the period of finishing works on the territory of waste water clarification plant/ no gathered shells of Mollusca were found in the vicinity of the airport. Only sporadically the Mollusca were eaten by birds which results from the reduced quantity of the individual species of both groups followed
5. The result of the field research proved a high bioindication control of either of the two groups of animal studied.

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Tab.1. Species composition of the malacofauna in environs of the airport Bratislava-Ivánka pri Dunaji in the year 1979.

n. c.	Species	Location						
		1	2	3	4	5	6	7
SI	<i>Aegopinella epipedostoma</i> (Fag.)							9
SI	<i>Cochliodina laminata</i> (Mtg.)				4			1 1
1	<i>Monachoides incarnata</i> (Möll.)			1	1			9 1
SI	<i>Trichia unidentata</i> (Drap.)				3			

SI(M)	<i>Arianta arbustorum</i> (L.)	1	1	48
SI(M)	<i>Cepaea hortensis</i> (Müll.)	2	7	8
SI(M)	<i>Trichia striolata</i> (C.Ptrr.)		1	48
SI(M)	<i>Bailea diplicata</i> (Mtg.)	3		
4 SI(st)	<i>Aegopineila minor</i> (Stab.)	3	1	1
SI(st)	<i>Bradybaena fruticum</i> (Müll.)	3	2	19
SI(st)	<i>Helix pomatia</i> L.	3	5	1
SI(H)	<i>Vitrea crystallina</i> (Müll.)			1
3 SI(h)	<i>Clausilia pumila</i> C.Ptrr.	1	1	2
ST	<i>Cecilioides acicula</i> (Müll.)	2	2	2
ST	<i>Gramaria rrummentum</i> (Drap.)	1	1	19
ST	<i>Heilicella ovata</i> (Menke)	1	10	5
4 ST	<i>Heilocopsis striata</i> (Müll.)	2	5	5
ST	<i>Chondruia tridens</i> (Müll.)	2		
SI(SI)	<i>Cepaea vindobonensis</i> (Fer.)	1	39	1
6 X	<i>Cochlicopa luoriceella</i> (Porro)	2		
PT	<i>Pupilla muscorum</i> (L.)	2	1	11
PT	<i>Truncateolina cylindrica</i> (Fér.)			35
5 PI(SI)	<i>Vallonia costata</i> (Müll.)	1	2	35
PT	<i>Vallonia pulchella</i> (Müll.)			11
Sist	<i>Euomphalia strigella</i> (Drap.)	9		
M	<i>Cochlicopa luurica</i> (Müll.)			2
M	<i>Trichia lubomirskii</i> (Slos.)	2		
M	<i>Trichia hispida</i> (L.)			2
M	<i>Vitrina pellucida</i> (Müll.)	1		2

RP	<i>Oxylooma elegans</i> (Risso)	(, J) autoreducens	57	57	SI(H)
9 RP	<i>Vallonia enniensis</i> (Grd.)	(, J) heterostoma	2	2	SI(H)
RP	<i>Zonitoides nitidus</i> (Möll.)	(, J) strobilifer	5	5	SI(H)
RV	<i>Lithoglyphus naticoides</i> (C. Pfeff.)	1			
RV(SG)	<i>Anodonta anatina</i> (L.)	1			
RVSG	<i>Physa acuta</i> (Drap.)		34		
SG	<i>Acroloxus lacustris</i> (L.)		1	3	(H) 18
SG	<i>Armiger crista</i> (L.)			3	
SG	<i>Gyraulus laevis</i> (Alder)			55	(H) 18
10 SG	<i>Gyraulus albus</i> (Möll.)			6	
SG	<i>Lymnaea auricuiaria</i> (L.)	10		1	
SG	<i>Lymnaea stagnalis</i> (L.)		8	4	
SG	<i>Pleuroboreus cornutus</i> (L.)			5	
SG(PD)	<i>Viviparus acerosus</i> (Bourg.)				4
PD	<i>Pleuroboreus planorbis</i> (L.)			1	
PDt	<i>Anisus spirorbis</i> (L.)			1	
complex species		15	15	10	12 14 9 10

Explanations

E. c. - Ecologic characteristics (Ložek, 1964)

1 - Woodland s.str. (silvicolae);

2 - predominantly woodland; SI(M) - woodland to mesic open habitats;

SI(st) - woodland to xeric open habitats; SI(H) - woodland to damp open habitats;

3 - damp woodland (SI(h)/

4 - steppe and xerothermic open habitats (steppicolae); ST(SI) -

partly shaded xerothermic open habitats; ST - steppe, rocky step-

- 5 - open ground in general (patenticolae) - PT
 6 - xeric (xericolae) - X
 7 - mesic in general (agricolae) - M
 9 - wetlands, banks, very moist habitats (ripicolae) - PR
 10 - aquatic habitats; RV - rivicolae; SG - stagnicolae (stagnancy);
 PD - paludicolae

Tab.2. Birds of the neighbourhood of the Bratislava-Ivánka airport, which according to our observations and data of other authors eat molluscs

EG	E CH	Species	CH O	Q CH
1	S SI	Cuculus canorus	m	-
	SI	Oriolus oriolus	b	-
	SI	Garrulus glandarius	m	-
	SI	Parus major	bmw	-
	SI	Parus caeruleus	bmw	-
	SI	Turdus philomelos	bm	-
	SI	Phoenicurus phoenicurus	m	-
	SI	Hippolais icterina	b	-
	SI	Phylloscopus collybita	bm	-
	SI	Regulus regulus	w	-
2	SI-A	Buteo buteo	m	-
	SI-A	Falco tinnunculus	bmw	-
	SI-A	Columba palumbus	b	-
	SI-A	Streptopelia turtur	bm	-
	SI-A	Athene noctua	bm	-
	SI-A	Corvus corone	bm	-

Q CH - quantity change: - reduction of the quantity
eventually no nidification found after 1983

SI-A	<i>Corvus frugilegus</i>	mw	11	bauern haen - 3
SI-A	<i>Corvus monedula</i>	x	bw	-
SI-TH	<i>Pica pica</i>	m	bmw	-
SI-TH	<i>Turdus viscivorus</i>	w	-	11
SI-TH	<i>Turdus pilaris</i>	w	-	11
SI-TH	<i>Turdus merula</i>	bmw	-	11
SI-TH	<i>Luscinia megarhynchos</i>	b	-	-
SI-TH	<i>Erithacus rubecula</i>	bm	-	-
SI-TH	<i>Sylvia communis</i>	bm	-	-
SI-A	<i>Sturnus vulgaris</i>	bm	-	-
SI-A	<i>Emberiza citrinella</i>	bmw	-	-

3	A	<i>Phasianus colchicus</i>	bmw	11	12	11	-
	A	<i>Coturnix coturnix</i>	b	-	-	11	-
	A	<i>Asio flammeus</i>	m	-	-	11	-
	A	<i>Cenanthe oenanthe</i>	bm	-	-	11	-
	A	<i>Saxicola rubetra</i>	bm	-	-	11	-
	A	<i>Saxicola torquata</i>	bm	-	-	11	-
	A	<i>Emberiza hortulana</i>	m	-	-	11	-

4	SG	<i>Ixobrychus minutus</i>	m	-	11	-	-
	PDt	<i>Ciconia ciconia</i>	m	-	11	-	-
	SG	<i>Anas platyrhynchos</i>	mw	-	11	-	-
	SG	<i>Anas querquedula</i>	w	-	11	-	-
	SG	<i>Gallinula chloropus</i>	b	-	11	-	-
	PDt	<i>Vanellus vanellus</i>	m	-	11	-	-
	PDt	<i>Numenius arquata</i>	m	-	11	-	-
	RP	<i>Lactitis hypoleuca</i>	r	-	11	-	-

RV-PDt	<i>Larus canus</i>	mw
RV-PDt	<i>Larus ridibundus</i>	mw
RP	<i>Motacilla alba</i>	bm
SG	<i>Emberiza schoeniclus</i>	m

5	S	<i>Columba livia f. domestica</i> bmw
	S	<i>Streptopelia decaocto</i> m
	S	<i>Passer domesticus</i> m

Notes: The ecological characteristic of the species was adapted to the characteristics of the eotypes of molluscs by Lisicky /1982/.

EG - ecologic groups, 1 - species found on the investigated territory only in the forest growths (breeding or occurring out of the breeding period), 2 - mostly forest species, 3 - species occurring in open biotopes, 4 - aquatic birds, 5 - synanthropic species

E CH - ecological characteristic of the species:

SI - species breeding and looking for food in forest, SI-TH species breeding except forest also in brushes on the territory surrounding the waste water clarification plant, those in the field brushes etc., SI-A species breeding in the forest, but finding their food on the fields, A - species of open biotopes, SG - species found in stagnant waters, RP - species occurring on the bank of river (Small Danube), RV - species which are founding on the running waters, PDt - species found on wetlands and wet depressions, S - synantropic species

CH O - character of occurrence: b - breeding, m - migration or occurring out of the breeding period, w - wintering

Q CH - quantity change: - reduction of the quantity, eventually no nidification found after 1983

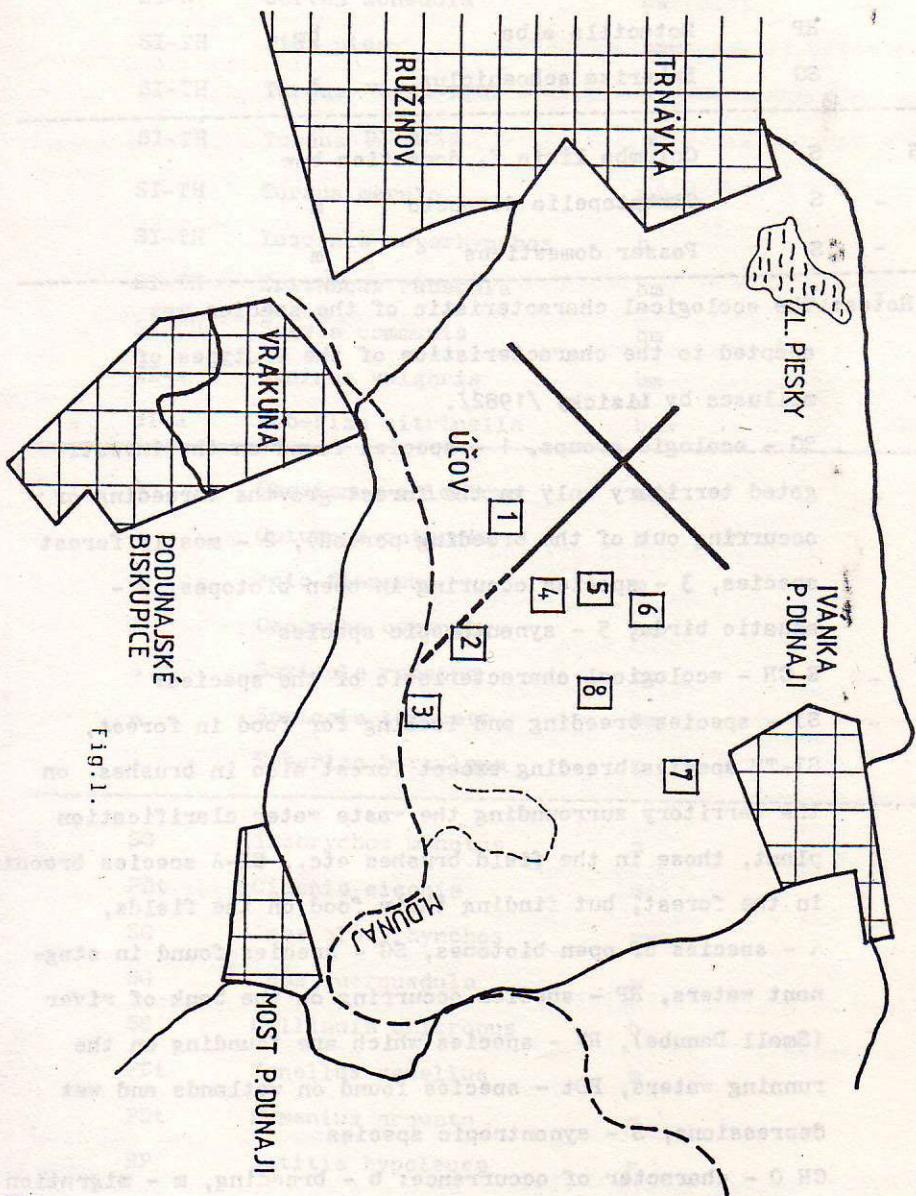


Fig. 1.

Notes to Figure 1

- 1 - Hard floodplain forest with a water area in the residue of the previous meander of the Small Danube /a locality disturbed by the construction of a wastewater clarification plant.
- 2 - A brush biotope at the first km of the take-off run way of the airport. The growth was removed when the take-off run way was completed.
- 3 - Xerothermic biotope at the Small Danube /disturbed by the construction of the airport/.
- 4 - A periodical bog in the residue of the original meandre of the Small Danube with neigborring tree and brush growth /the biotope disappeared after completion of the airport/
- 5 - The residue of the dead arm of the Small Danube with a growth of *Typha* sp. brought with the waste of the building material and arable land.
- 6 - Xerothermic biotope with a grassy growth.
- 7 - A hard foodplain forest at the Frucké farm.
- 8 - A tree complex in the middle of agricultural land /night place for pheasants/.

Notes to Figure 2.: *Cepaea vindobonensis* /FÉR./ crushed shells

Notes to Figure 3.: *Arianta arbustorum* /L./, crushed shells on the localites 1 and 8.

Notes to Figure 4.: *Bradybaena fruticum* /MÜLL./, crushed shells at the stones of the locality 1.

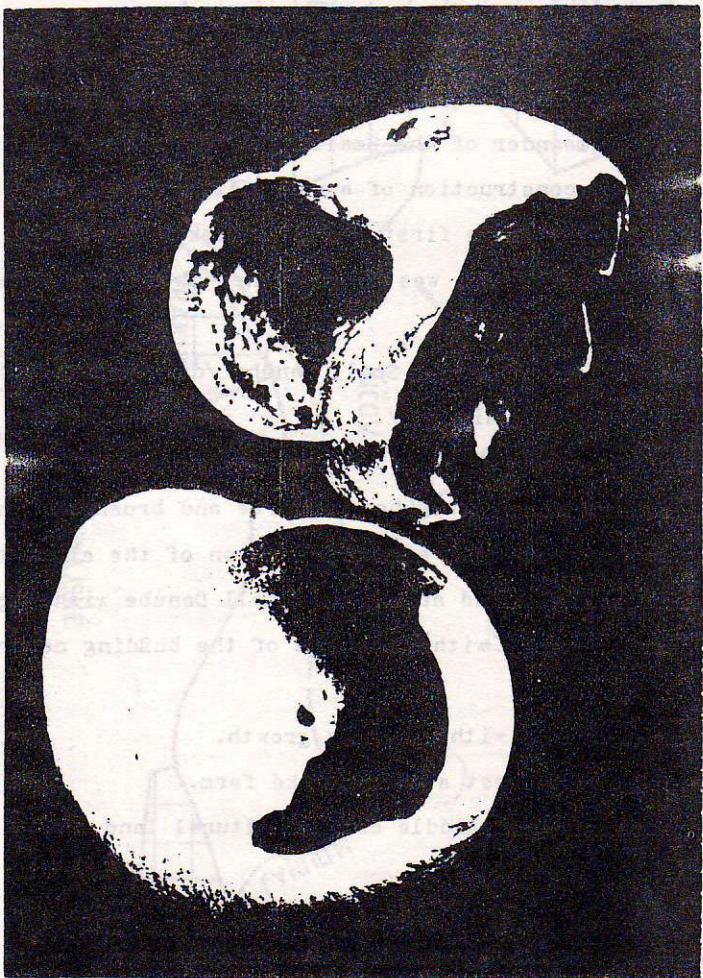


Fig. 2.

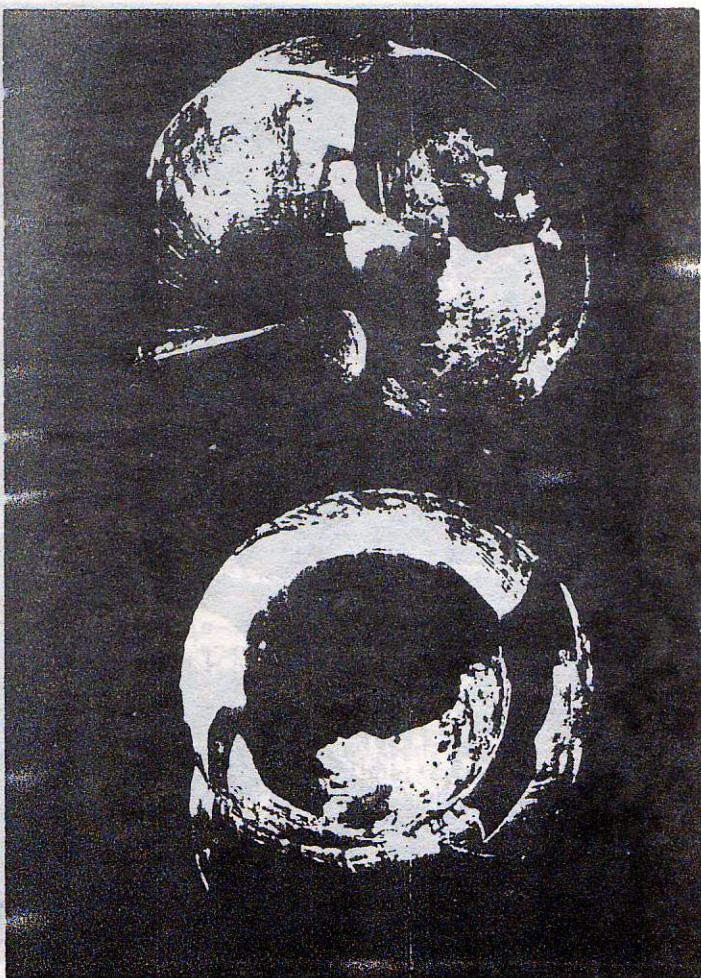


Fig. 3.



Fig. 4.

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