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DORMICE IN THE DIET OF OWLS IN THE MIDDLE EAST

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ABSTRACT. Among prey remnants of 42,290 animal individuals, collected in Turkey, Syria, Iran, and Israel, I determined 157 dormice of seven species: *Eliomys melanurus, Glis glis, Dryomys nitedula, Dryomys laniger, Myomimus personatus, Myomimus setzeri*, and an undescribed *Myomimus* sp. from the central Zagros Mts. Owl pellets were of four owl species: *Tyto alba, Bubo bubo, Strix aluco,* and *Asio otus.* In total, dormice formed only 0.37 % of prey, their dominance, however, increased from southwest towards northeast, begin 0.04 % in Israel and 0.97 % in Iran. Results show that the Middle East has more species of Gliridae than any other region of comparable size. *Myomimus setzeri* is for the first time reported from Turkey.

Key words: Middle East, owls' diet, dormice, owl pellets.

ORTADOĞU'DA BAYKUŞLARIN BESİN LİSTESİNDEKİ AĞAÇ FARELERİ

ÖZET . Türkiye, Suriye, İran ve İsrail'den toplanmış baykuş kusmukları içinde çeşitli hayvanlara ait 42290 besin atığı arasından 157 tanesinin *Eliomys melanurus, Glis glis, Dryomys nitedula, Dryomys laniger, Myomimus personatus, Myomimus setzeri*, ve Zagros Dağlarından türü teşhis edilememiş bir *Myomimus* sp. olmak üzere yedi ağaç faresi türüne ait olduğu tespit ettim. Kusmuklar *Tyto alba, Bubo bubo, Strix aluco* ve *Asio otus* olmak üzere dört baykuş türüne aittir. Total olarak ağaç farelerinin tüm besinler içindeki payı sadece % 0,37 dir. Ancak bölgesel çokluğu güneybatıda, İsrail'den % 0,04 ten başlayarak kuzeydoğuya, İran'a doğru artarak Iran'da % 0,97 'ye ulaşır. Sonuçlar Ortadoğu'nun diğer tüm benzer büyüklükteki bölgelere göre daha fazla Gliridae türü içerdiğini gösterir. *Myomimus setzeri* Türkiye'de ilk defa kayıt edilmiştir.

Anahtar sözcükler. Ortadoğu, baykuş besinleri, ağaç fareleri, baykuş kusmuğu.

INTRODUCTION

Dormice are an interesting, but also poorly known group of rodents in the Middle East. Two species (*Eliomys melanurus, Dryomys nitedula*) occur in Arabia (1), more specifically in Israel (2), Lebanon, and Syria (3), while *E. melanurus* was recorded also in Iraq (4). Another two species (*Glis glis, D. nitedula*) were known from Iran by 1960s (5). This number increased when *Myomimus setzeri*, a species new to science, has been described from three individuals in the province Kordesten, north-west Iran (6). Closely related, but poorly known *Myomimus personatus*, occurs in the Turkmenian part of the Koppe Dagh Mts. (7); this species was also found as an owl prey (8). No less than five dormice species are native to the eastern part of Turkey, viz *E. melanurus, D. nitedula, Dryomys laniger, G. glis* and *Muscardinus avellanarius* (9).

During the field trips to Israel, Syria, Turkey, and Iran organised by the Charles University and the Czech National Museum (both at Prague), I systematically collected owl pellet samples. My main aim was to acquire faunal data on small mammals. Although dormice were very rare in the pellets, I found some very rare and poorly known species.

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MATERIAL AND METHODS

Owl pellet samples were collected during eight trips to the Middle East (Turkey, Syria, Iran, and Israel) in 1992, and from 1996 to 2001. I collected fresh pellets as well as decomposed pellet material, which was presumably up to 50 years old. Prey remains by *Bubo bubo, Strix aluco, Strix butleri, Athene brama* and *Tyto alba* were found left on the rocks. Besides, pellets by *Strix aluco* were regularly collected also under trees in forests, those by *Asio otus* and *T. alba* under the trees in parks and in gardens, and pellets by *T. alba* and *Athene noctua* in abandoned historical buildings and ruins.

Collected pellets were first processed in the solution of NaOH and then washed in water. Mammalian jaws and diagnostic remains of other animals were separated for subsequent determination. Abundance of dormice, as well as of other prey species, was estimated as the minimum number present, i.e. as the number of the most abundant determined remain of the species in a sample.

RESULTS

In total, I identified 42,290 individuals of preyed animals, 157 of which (= 0.37 %) were dormice. Percentage of dormice preyed by particular owl species varied between 0 % in *S. butleri*, *A. noctua* and *A. brama* up to 2.32 % in *S. aluco* (Table 1). There were, however, obvious differences among the regions and the relative abundance of dormice increased from the southwest (Israel = 0.04 %) to the northeast (Iran = 0.97 %).

Table 1. Summary of the abundance of dormice in the diet of owl from the Middle East.

Abbreviations: *T.alb - Tyto alba, B.bub - Bubo bubo, S.alu - Strix aluco, S.but - Strix butleri, A.otu - Asio otus, A.noc - Athene noctua, A.bra - Athene brama.*

*only rough estimate of total prey is provided (determination still in progress)

Country		*T.alb*	*B.bub*	*S.alu*	*S.but*	*A.otu*	*A.noc*	*A.bra*	Total
Israel	Total prey	4298	148	63	111	596			5216
	Dormice	2	0	0	0	0			2
	% of prey	0.05	0	0	0	0			0.04
Syria	Total prey	17956*	284	369		516	454*		19579
	Dormice	9	0	8		10	0		27
	% of prey	0.05	0	2.17		1.94	0		0.15
Turkey	Total prey		5862	1198			59		7119
	Dormice		19	8			0		27
	% of prey		0.32	0.67			0		0.38
Iran	Total prey	1040	6784	609	117	107	896	823	10376
	Dormice	15	50	36	0	0	0	0	101
	% of prey	1.44	0.74	5.91		0	0	0	0.97
Total	Prey	23294	13078	2239	228	1219	1409	823	42290
	Dormice	26	69	52	0	10	0	0	157
	% of prey	0.11	0.53	2.32	0	0.82	0	0	0.37

One single dormouse species was found as a prey of *A. otus*, three were preyed by *T. alba* and *S. aluco*, and as many as five by *B. bubo* (Table 2). *M. avellanarius* was the rarest dormouse in the samples, with merely two individuals, both from northern Turkey. Similarly rare was *D. laniger*, preyed by *B. bubo* near Horasan, eastern Turkey. *E. melanurus* was also uncommon. In Israel, it was preyed in cultivated areas by *T. alba*, while i found it in Syria also in the pellets by *A. otus*. Another uncommon species, *D. nitedula*, was preyed by three owl species in three countries studied. Habitat varied from çoastal areas of the Mediterranean Coast in Turkey and Syria to the mountain steppes of eastern Turkey, the Zagros Mts. and southeaster Iran (the Kerman province). *G. glis* was common prey of *S. aluco* in the forests on the northern slopes of the Elborz Mts., Iran, where its percentage in pellets (12.54 %) was higher than in any other dormouse in the study area.

Table 2. Abundance of dormice in the diet of owl according to country.
Abbreviations: *E.mel - Eliomys melanurus, D.nit - Dryomys nitedula, D.lan - Dryomys laniger, M.ave - Muscardinus avellanarius, G.gli - Glis glis, M.set - Myomimus setzeri, M.per - Myomimus personatus, M.*sp. *- Myomimus* sp.

Country	Species	*E.mel*	*D.nit*	*D.lan*	*M.ave*	*G.gli*	*M.set*	*M.per*	*M.*sp.	Total
Israel	*T.alba*	2								2
Syria	*T.alba*	7	2							9
	A.otus	10								10
	S.aluco		8							8
Turkey	*B.bubo*		4	3			12			19
	S.aluco		5		2	1				8
Iran	*B.bubo*		2				41	6	1	50
	T.alba		1						14	15
	S.aluco		1			35				36
	Total	19	23	3	2	36	53	6	15	157
	%	12.1	14.6	1.9	1.3	22.9	33.8	3.8	9.6	100

I found *M. setzeri* in *B. bubo* pellets from the mountains of eastern Turkey (10) and from northwester Zagros (province Azerbayjan-e Garbi, Iran). The highest occurrence of *M. setzeri* (3.20 %) was in Takht-e Soleyman, northwester Iran, at the altitude of 2800 m a.s.l. In the same area I did not found this dormouse in samples collected below 1500 m a.s.l. *M. setzeri* was also absent from pellet samples obtained the south of Kordestan. E.g., it did not occur in a sample of *B. bubo* from Lenje Abad (1700 m a.s.l.; province Lorestan). In two places in the province of Bakhtaran, central Zagros (1300 m a.s.l.) I collected remnants of another member of the genus *Myomimus*, evidently still undescribed so far (Table 3). It is characterised by a mandible larger than in *M. setzeri*, but smaller than in *M. personatus* from the Koppe Dagh Mts., northeaster Iran (Fig. 1).

DISCUSSION

Dormice are rarely reported in the owls' diet from Middle East. Published data are often incomplete and thus do not allow to estimate their relative abundance in the diet. My samples are biased in several ways. Owl pellets were sampled only during a short-term visit to Israel and are not representative for this country. The entire area of the Middle East was not sampled with equal and there are still major geographic gaps present (e.g., western Turkey). In spite of these limitations, published material gives the most complete information available so far, of a rare group of animals from the area on the crossroad of different zoogeographical pathways. The Middle East has probably higher number of Gliridae than any comparable region in the world.

Table 3. List of owl pellet samples containing dormice remnants. See Tables 1 and 2 for abbreviations

Country	Site	Date	Owl	Prey	Count	%	Total prey
Israel	Nizzana	Dec 7,1996	*T.alb*	*E.mel*	2	0.39	514
Syria	Halabyieh	Jun 17,1998	*T.alb*	*E.mel*	3	0.19	1565
	Yabrud	Jun 27,1998	*T.alb*	*E.mel*	3	1.47	204
	Buransk	Apr 29, 2001	*T.alb*	*E.mel*	1	2.04	49
	Qal at Salahidin	Jun 30,1998	*T.alb*	*D.nit*	1	0.66	151
	Qualal-al Hisn	May 1, 2001	*T.alb*	*D.nit*	1	0.26	384
	Palmyra	Jun 23,1998	*A.otu*	*E.mel*	3	1.82	165
		Apr 23, 2001	*A.otu*	*E.mel*	7	2.47	283
	Rabiah	Jul 7,1998	*S.alu*	*D.nit*	2	2.99	67
		May 4, 2001	*S.alu*	*D.nit*	6	4.17	144
Turkey	Hattutas	Apr 22,1996	*B.bub*	*D.nit*	3	0.43	705
	Ishak Pasa Sarayi	Apr 30,1997	*B.bub*	*D.nit*	1	0.57	174
		Apr 30,1997	*B.bub*	*M.set*	1	0.57	174
		Sep 30,1998	*B.bub*	*M.set*	4	1.33	301
	Horasan	May 14,1996	*B.bub*	*D.lan*	3	0.43	703
	Sarikamish	Jun 4,1992	*B.bub*	*M.set*	3	0.24	1243
	Bendimahi	Jun 5,1992	*B.bub*	*M.set*	4	0.26	1562
	Cevlik	Jul 3,1998	*S.alu*	*D.nit*	1	1.00	100
		Apr 12,2001	*S.alu*	*D.nit*	4	6.45	62
	Abant Golu	May 16,1996	*S.alu*	*M.ave*	2	3.57	56
		May 16,1996	*S.alu*	*G.gli*	1	1.79	56
Iran	Sivand	Apr 30,1996	*B.bub*	*D.nit*	1	0.49	203
	Qare Kelisa	Oct 20,1998	*B.bub*	*M.set*	7	1.57	445
	Mahabad	Oct 19,1998	*B.bub*	*M.set*	1	0.78	128
	Choplu	Oct 2,1998	*B.bub*	*M.set*	19	1.55	1226
	Takht-e Suleyman	Oct 3,1998	*B.bub*	*M.set*	14	3.20	438
	Agh Mazar	May 12,1997	*B.bub*	*M.per*	5	1.82	275
	Bazangan	May 11,1997	*B.bub*	*M.per*	1	0.85	118
	Khosrow Abad	Oct 18,1998	*B.bub*	*M.*sp.	1	0.32	312
	Deh Bakri	Apr 8, 2000	*B.bub*	*D.nit*	1	0.49	206
	Bisotun	Oct 7,1998	*T.alb*	*M.*sp.	14	5.00	280
		Oct 7,1998	*T.alb*	*D.nit*	1	0.36	280
	Czurti	May 11,1996	*S.alu*	*G.gli*	32	26.23	122
	Teng Rah	May 13,1997	*S.alu*	*G.gli*	2	28.57	7
	Asalem	May 17,1997	*S.alu*	*G.gli*	1	1.20	83
	Firuz Abad kanyon	Apr 21, 2000	*S.alu*	*D.nit*	1	0.78	129

Percentage of dormice in the prey of an owl presumably reflects their relative numbers within the owls' home range. This figure, however, is influenced by the individual and species-specific hunting strategy and preferences of an owl. There seems to be a pattern, evident on a broader geographic scale. Thus, dormice are more numerous particularly in the diet of *S. aluco* both in central Europe and in the Middle East. Smaller percentages can be found in the diet of *B. bubo* and *T. alba*, rarely in the diet of *A. otus* and *A. noctua* (11).

Information on prey species composition of owl diets is of considerable fauna value. It potentially indicates the sites with rare dormice, which can be studied subsequently in greater taxonomical and ecological detail.

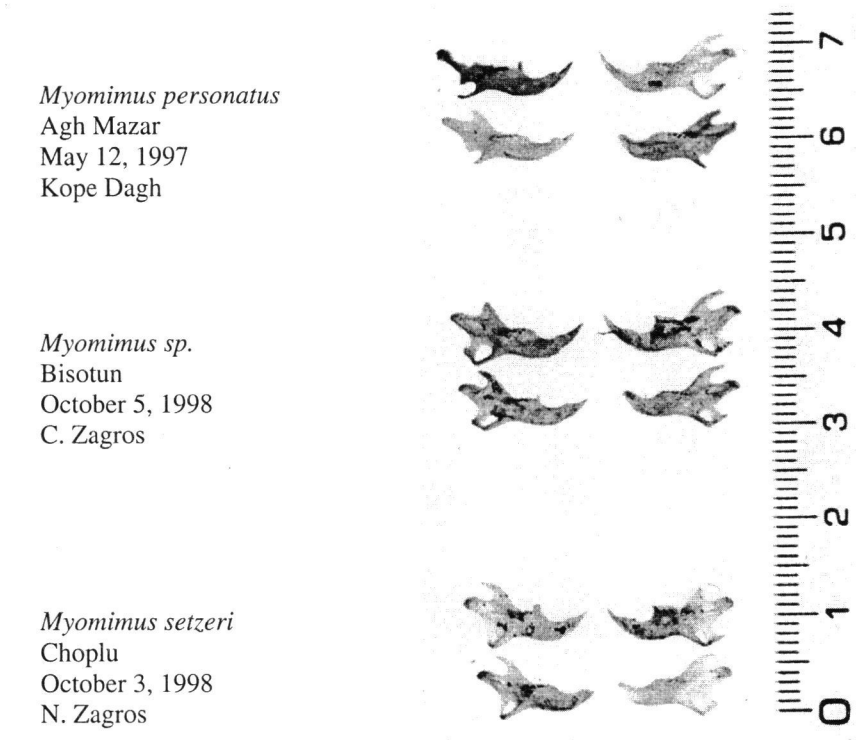

Fig. 1. Three species of the genus *Myomimus* from Iran.

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