

FRAGMENTA THERIOLOGICA

A note on the diet of stone marten in southeastern Romania

Jerzy ROMANOWSKI and Grzegorz LESIŃSKI

Romanowski J. and Lesiński G. 1991. A note on the diet of stone marten in southeastern Romania. Acta theriol. 36: 201 – 204.

We studied the diet of stone martens *Martes foina* (Erxleben, 1777) inhabiting the ruins of Byzantine temple near Enisala (southeastern Romania). Based on analysis of 103 excrements, birds and mammals predominated in the diet, constituting 45.2% and 36.1% of consumed biomass. Reptiles, amphibians, insects and fruits were supplementary food. We also found bats, items rarely reported in the marten's diet. The diet was characterized by a high contribution of animals associated with steppe habitat and by a low share of anthropogenic food.

Institute of Ecology, Polish Academy of Sciences, Dziekanów Leśny n. Warsaw, 05-092 Łomianki, Poland

Key words: diet, *Martes foina*, Romania

Introduction

The stone marten *Martes foina* (Erxleben, 1777) inhabits almost all Europe and is one of the commonest carnivores. There have been few studies of the stone marten's diet, and they have come from a limited range, mainly from West and Central Europe and the Soviet Union (Novikov 1962, Waechter 1975, Skirnisson 1986, Marchesi *et al.* 1989). All these studies indicate polyphagy and strong seasonal variation. This paper presents the first data on the diet of stone marten in Romania.

Study area, material and methods

We studied martens at the ruins of a Byzantine temple near the village of Enisala (44° 52'N, 28° 57'E, 7 km east of Babadag). Ruins of the temple are located on the top of rocky hill covered with scarce steppe vegetation. The hill is surrounded by the Black Sea lagoon on the East, large vineyards on the South, and the floodplain of the channel connecting Lake Babadag with the lagoon on the North. The buildings of Enisala village are 1 km to the West of the hill. Martens inhabited crevices and niches in the walls of the temple.

This study is based on analyses of 103 excrements, collected on 24 October 1983 at the entrances to three niches 7 meters above the ground. The shape and size of excrements (the diameter was about 0.8 cm) indicated genus *Martes*. The deforested habitat indicated *M. foina*: unlike *M. martes*, *M. foina* inhabits rocky steppe. Further, only *M. foina* is typically associated with human structures.

Single excrements were separated under a binocular microscope into the various components, and the separated parts were rinsed on a sieve, dried to constant weight in a desiccator, and weighed. Mammals were identified mainly on the basis of hairs, according to Day (1966), and in a few cases on the basis of skulls and teeth. Feathers were identified, usually to families, according to Day (1966) and Brom (1980). Other undigested remains (skeletal remains, insects, plant remains) were identified by comparing with reference collections.

The results are presented in two manners: first, the frequency of occurrence of each type of prey; and second, the percentages of the biomass of food components (Lockie 1961). In order to estimate the consumed biomass, we used correction factors (coefficients of digestibility) stated by Lockie (1961), and Goszczyński (1976), with the following values: 23 for rodents and insectivores, 35 for birds, 14 for fruits and 5 for insects. Based on Delibes (1978), we used a correction factor of 45 for reptiles, and assumed the same value for amphibians.

The Simpson index of diet diversity was calculated from the formula:

$S = 1 / \sum p_i^2$, where p_i is proportion of i th item in the diet.

Results

Birds and mammals formed the basic components of the diet of martens, together constituting over 80% of consumed biomass (Table 1). Reptiles also formed an important part, but other components were less common. Among all mammals, microtine rodents were preyed on most frequently and their remains occurred in 1/3 of excrements (Table 1). Preserved teeth and fragments of mandibles were identified as *Microtus arvalis* (Pallas, 1779) or *M. rossiaemeridionalis* (Ognev, 1924). Among other rodents, single specimens of *Mus musculus* Linnaeus, 1758 and *Apodemus* sp. were identified. Souseliks [probably *Spermophilus citellus*

Table 1. The diet of stone martens near Enisala (SE Romania).
n – number of occurrence; S – Simpson diversity index.

Item	n	Frequency of occurrence	Percent of biomass
<i>Insectivora</i>	3	1.9	1.2
<i>Chiroptera</i>	2	1.3	1.1
<i>Spermophilus</i>	16	10.1	9.4
<i>Microtus</i>	31	19.6	21.7
<i>Muridae</i>	3	1.9	0.9
<i>Mammalia</i> unident.	4	2.5	1.8
<i>Mammalia</i> subtotal	59	37.3	36.1
<i>Anatidae</i>	2	1.3	1.2
<i>Rallidae</i>	4	2.5	2.6
<i>Columbidae</i>	1	0.6	1.2
<i>Passeriformes</i>	22	13.9	21.0
<i>Aves</i> unident.	18	11.4	17.6
Egg shells	4	2.5	0.8
<i>Aves</i> subtotal	51	32.3	45.2
<i>Reptilia</i>	12	7.6	14.4
<i>Amphibia</i>	6	3.8	2.8
<i>Insecta</i>	17	10.8	0.4
Plant material	9	5.7	1.0
Anthropogenic food	4	2.5	0.1
Total	158	100.0	100.0
S			6.47

(Linnaeus, 1766) often spotted on the hill], were relatively abundantly represented in the food. Remains of insectivores occurred in three excrements, and one specimen of *Crocidura leucodon* (Hermann, 1780) was recognized from the skull and mandible. In two excrements remains of two different species of bats were found. One was identified from the skull as *Vespertilio murinus* Linnaeus, 1758.

Small passerines were the most common avian prey. Waterfowl (*Anatidae* and *Rallidae*) were also well represented. Egg shells were present in 4 excrements.

Reptiles were represented only by snakes, among which the grass snake *Natrix* sp. was identified. Amphibians were represented by *Anura*.

Insects, mainly *Carabidae*, occurred in 17 excrements but contributed little to biomass. Martens also consumed small amounts of plant material, mainly fruits, among which grapes predominated. We found fragments of paper and food wrappings in four excrements.

Discussion

The data show a diverse diet, consisting of mammals, birds, reptiles, amphibians, insects and plants. The high value of diversity index (Table 1) confirms polyphagy of martens. The contribution of mammals and birds to the diet is similar to results of other studies in Europe (Abelencev 1973, Waechter 1975, Delibes 1978). We also found a high proportion of reptiles, which are rarely reported in the diet of stone martens and only in southeastern Spain have some importance (Amores 1980). The share of fruits was surprisingly low. This kind of food is most commonly eaten by martens during summer and autumn, and annually makes up about 40% of consumed biomass (Goszczyński 1976). The small share of fruits may indicate that the collected excrements did not come from summer or autumn.

The food of martens included animals associated with a variety of habitats: steppe (sousliks and voles), aquatic (waterfowl and amphibians), and developed (house mice). Prey animals associated with the steppe habitat surrounding the ruins were especially common in diet. The presence of grape seeds and food wrappings indicate that martens also penetrated the vineyards and village. It can be assumed that bats, very rare in the diet of this predator (Urbańczyk 1981), were caught in niches in the walls of the ruins. This diverse diet reveals that martens hunted in variety of habitats. We found a relatively small proportion of anthropogenic food, a common food for this species in western Europe (Waechter, 1975) and the Ukraine (Abelencev 1973).

Acknowledgements: We thank P. Stouffer for improving the English.

References

- Abelencev V. I. 1973. Kamiennaja kunica. Ukraina i Moldavia. [In: Sobol, kunicy, charza. A. A. Nasimovič, ed.] Nauka, Moskva: 202 – 213. – Amores F. 1980. Feeding habits of the stone martens, *Martes foina* (Erleben, 1777), in south western Spain. Säugetierkd. Mitt. 28: 316 – 322. – Brom T. G. 1980. Microscopic identification of feather remains after collisions between birds and aircraft. Amsterdam: 1 – 89. – Day M. G. 1966. Identification of hair and feather remains in the gut and faeces of stoats and weasels. J. Zool., Lond. 14: 201 – 217. – Delibes M. 1978. Feeding habits of the stone marten *Martes foina* (Erleben, 1777), in northern Burgos, Spain. Z. Säugetierk. 43: 282-288. – Goszczyński J. 1976. Composition of the food of martens. Acta

theriol. 21: 527 – 534. – Lockie J. D. 1961. The food of the pine marten *Martes martes* in West Ross-Shire, Scotland. Proc. zool. Soc., Lond. 136: 187 – 195. – Marchesi P., Lachat N., Lienhard R., Debive Ph. and Mermod C. 1989. Comparaison des régimes alimentaires de la fouine (*Martes foina*) et de la martre (*Martes martes*) dans une région du Jura suisse. Revue suisse Zool. 96: 281 – 296. – Novikov G. A. 1962. K ekologii kamiennoj kunicy v lesostepnykh dubravach. Bull. Mosk. Obšč. Ispit. Prirody, otd. Biol. 67, 5 – 16. – Skimisson K. 1986. Untersuchungen zum Raum-Zeit-System freilebender Steinmarder (*Martes foina* Exrl., 1777). Beitr. Wildbiologie 6: 1 – 200. – Urbańczyk Z. 1981. Fledermäuse (*Chiroptera*) in der Nahrung des Marders (*Martes* sp.). Säugetierkd. Mitt. 29: 77 – 79. – Waechter A. 1975. Ecologie de la fouine en Alsace. Ter et Vie 29: 399 – 457.

Received 2 March 1988, revised 11 March 1991, accepted 30 May 1991.

Acta Theriologica 36 (1 – 2); 204 – 205, 1991.

BOOK REVIEW

Domestic animals from the zoological perspective

Hautiere – zoologisch gesehen. Herre W. and Röhrs M. Gustav Fischer, Stuttgart, New York, 1990, pp. 415 ISBN 3-437-20446-7.

Domestic animals are so common in the contemporary countryside that, in the majority of ordinary consumers (also of these animals and their products), they do not evoke philosophical associations or questions, such as: "How did they enter human habitats?", "What are they in comparison with other wild species?", "Do they undergo changes, and if so, how quick are these changes?" Scarcely anyone asks about problems like the bilateral interaction of domestic animals and people. This indifference and lack of broader interest results from various causes, one of them, which plays a substantial role, is the fascination with modern technique which stirs up more emotions than the seemingly unalterable realm of domestic animals.

Obviously, the technocratic modern world has not lost completely its interest in biology. That interest has been preserved by scientists, hobbists, and professionals involved in stock production. For the three groups, both the causes and directions of interests are different. Nevertheless, those people maintain a certain system of values opposing a narrow technicalization of life. Thank to it, teddy bears have not been completely forced out by car models from among children's toys; and a real fun for both adults and children is the company of domestic animals, not only dogs and cats, but also guinea-pigs, hamsters and others.

Recently an attractive book, wrote by two outstanding zoologists, about domestic animals viewed from the zoological perspective has been published. It is a very interesting study which contains comprehensively many problems connected with animal domestication, the changeability of forms, modifications influenced by this domestication and the man-animal interaction. It should be stressed that the authors used a great number of literary sources from Darwin through Adametz to the abundant works of the 1980's. In spite of many citations with other authors' opinions, the study is not compilatory in character. The expressed views are the effect of the authors' own considerations. Besides, the opinions of other explorers, quoted or mentioned, are frequently not in harmony with the authors' opinions, and as such, they enable to follow the reasoning and conclusion-drawing by the authors.

The book consists of five parts of varied volumes. The titles of these parts give the best representation of the work's content.

Part A: Introduction, in which the authors base the opinion why research in domestic animals has a zoological aspect, and a chapter in which they deal with the essence of the domestication process and the "domestic animal" notion, as well as with an attempt to formulate a definition of this notion.