

Preliminary study of rodents' fauna (mammalia; rodentia) of Khaf township, southeast of Khorasan Razavi province, Iran, using pellets of birds of prey

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Abstract

The rodents' fauna of boundary zones of Iran are still poorly known. In this research rodents fauna of Khaf township in northeast of Iran have been reported mainly based on pellets of birds of prey. Alive samples and also rodent's remains from pellet materials of birds of prey in the present study was collected from 46 localities in Khaf, northeast of KhorasanRazavi province and different specimens were collected during the period of April, 2011 until September, 2012. A total of 718 prey bird pellet material and six complete (living) samples were identified based on morphological methods on external anatomy (in complete samples), teeth, cranial and dentary bones (in pellets) and as a result of the study, the rodents fauna of Khaf consists of twelve species belonging to nine genera and three families including; 1) Dipodidae (*Allactaga elater*), 2) Cricetidae (*Cricetulus migratorius*), 3) Muridae (*Tatera indica*, *Gerbillus nanus*, *Meriones persicus*, *Meriones libycus*, *Meriones crassus*, *Meriones meridianus*, *Rhombomys opimus*, *Mus musculus*, *Nesokia indica*), and also one species of Lagomorpha (Ochotonidae: *Ochotona rufescense*) and Soricomorpha (Soricidae: *Crocidura gmelini*).

Keywords: Rodent's Fauna, Pellets, Khaf, Iran

Introduction

Documentation of the mammalian fauna of Iran is important for providing a basic data about mammalian diversity in this region (1). Also order Rodentia ranks first among mammal's species from the aspect of diversity.

Since gardens with dense pine tree and rocks are used as shelters by birds of prey (such as Falconiformes and Strigiformes), they often contain the remains of their foods. Birds do not have teeth, so they cannot chew their food. Birds swallow their food whole or tear it into small pieces to swallow. Owls tend to eat their food whole, whereas other birds of prey usually tear their food into small pieces, thereby avoiding most of the feathers and hair. Hawks and eagles also regurgitate pellets, but the pellets are small because hawks and eagles have very acidic enzymes in their

glandular stomachs, which can partially digest the feathers, bones, and hair that they might swallow (2). Pellet analysis also is a useful method for gaining additional insight into small mammal communities and distributions (3-6). Occasionally, known distributional limits of small mammals can be altered on the basis of identifiable material found in pellets (6). The aim of this study is to redouble our knowledge of diversity and distribution of rodents fauna of Iran.

Materials and methods

In this study, rodents assemblages from Khaf, southeast of KhorasanRazavi province were studied (Fig. 1A). Khaf township (34° 34' 35" N, 60° 08' 26" E, at an altitude of c. 950 m above sea level), is located in arid zone of northeast Iran and

has 123 km common border with Afghanistan country. It also presents a wide variety of habitats, including: sandy, rocky, woodland, grassland, desert and breadbasket.

Sampling was carried out in Khaf and the materials was collected by the authors from 46 localities during 18 month (Fig. 1B). Sampling methods comprised collecting pellets and using common rodent's trap. Traps were mostly used in open areas without any mountain or gardens. Totally 718 pellets and six alive samples were studied.

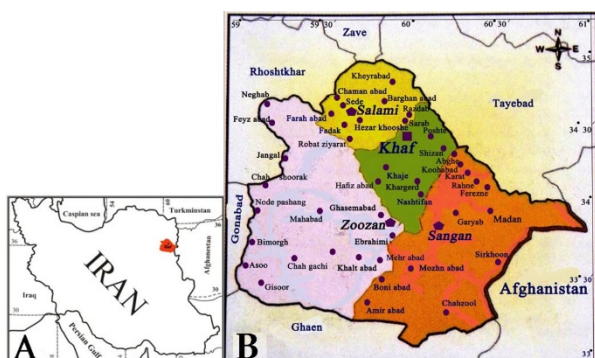


Figure 1. (A) Geographic position of Khaf township (Southeast of KhorasanRazavi; Iran), (34° 34' 35" N, 60° 08' 26" E, 950 m), **(B)** collecting sites in Khaf.

Components of each pellet were extracted and washed separately. Morphological features of pellets (skull and teeth) were investigated by stereomicroscope (Olympus SZH-10). Skull of live species were prepared too. The key of determination of species is from Corbet (7), and the classification of taxa is from Wilson and Reeder (8).

Results

Pellet contents

The samples included 718 pellets and contained 12 rodents species belonging to 3 families and also one species of Lagomorpha (Ochotonidae: *Ochotona rufescense*) and Soricomorpha (Soricidae: *Crocidura gmelini*).

Sampling results

Totally 6 specimen were obtained with the aim of traps.

The list of the identified specimens is reported in

Table 1 with some notes on their taxonomy and sampling locality.

Discussion

The boundary rodents of Iran have not been studied comprehensively. Birds of prey (Falconiformes and Strigiformes) which have good fly ability, feed mainly on rodents, and the hair and bones of the prey (undigested body parts) items are eliminated as pellets (9). Their food regime are specific in different area and depends on the geographical distribution, density and life style of rodents which all are under effect of species habitat preferences, climatic conditions and the geographic and topographic situations.

In the present study twelve rodent species were found in 46 localities in Khaftownship. The dominant species was *Cricetulus migratorius* and *Mus musculus* which is inhabitant of rocky areas and urban-rural zones respectively. But *Allactaga elater* and *Rhombomys opimus* were less abundant species (among Rodentia) (Fig. 2).

The density of the remains was different in each sites too. The Kushk garden (Salami City) was high while the fewer specimens were found in others locality. This is possibly related to different sampling. Also factors such as food resources, competition, predation and sheltering conditions affect the local distribution of rodent species (10). More ever in open areas in Khaf, the presence of birds of prey is affected by strong wind and also their pellets is outspreaded in wind and make finding them difficult.

In summary, 12 rodents species and one Lagomorpha and Soricomorpha species found in Khaf township in southeast of Khorassan Razavi province, Iran.

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Table 1. Distribution localities of studied taxa in 46 different localities.

Order	Family	Subfamily	Species	Pellet Collecting															
				Chaman abad	Sede	Kushk-e-Salami	Farah abad	Fadak	Hezar khushe	Robat-e-ziyarat	Khayr abad	Barghan abad	Razdab	Sarab	Foshte	Khaf	Shizan	Abghe	Khaje
Rodentia	Dipodidae	Allactaginae	<i>Allactaga elater</i>			X						X							
	Cricetidae	Cricetinae	<i>Cricetulus migratorius</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
		Arvicolinae	<i>Ellobius fuscocapillus</i>								X								
	Rodentia	Muridae	Gerbillinae	<i>Tatera indica</i>			X												
				<i>Gerbillus nanus</i>			X						X						
				<i>Meriones crassus</i>			X												
				<i>Meriones libycus</i>	X	X									X				
			<i>Meriones persicus</i>		X		X	X			X								X
			<i>Meriones meridianus</i>		X														
			<i>Rhombomys opimus</i>		X														
Murinae			<i>Mus musculus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
<i>Nesokia indica</i>	X	X		X	X		X						X						
Lagomorpha	Ochotonidae		<i>Ochotona rufescens</i>																
Soricomorpha	Soricidae	Crocidurinae	<i>Crocidura gmelini</i>			X													

Order	Family	Subfamily	Species	Pellet Collecting														
				Khargerd	Nashifan	Haiz abad	Kooh abad	Karat	Rahne	Ferezne	Madan	Garyab	Sangan	Khalt abad	Chah gachi	Gisoor	Asoo	
Rodentia	Dipodidae	Allactaginae	<i>Allactaga elater</i>															
	Cricetidae	Cricetinae	<i>Cricetulus migratorius</i>	X	X			X	X	X	X	X	X			X		
		Arvicolinae	<i>Ellobius fuscocapillus</i>															
	Rodentia	Muridae	Gerbillinae	<i>Tatera indica</i>									X					
				<i>Gerbillus nanus</i>									X	X	X			
				<i>Meriones crassus</i>														
				<i>Meriones libycus</i>														X
			<i>Meriones persicus</i>									X	X	X				
			<i>Meriones meridianus</i>									X	X		X			
			<i>Rhombomys opimus</i>										X					
Murinae			<i>Mus musculus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Nesokia indica</i>										X								
Lagomorpha	Ochotonidae		<i>Ochotona rufescens</i>								X		X					
Soricomorpha	Soricidae	Crocidurinae	<i>Crocidura gmelini</i>															

Order	Family	Subfamily	Species	Sampling with trap							Pellet Collecting							
				Sirkhoon	Mehr abad	Boni abad	Mozhn abad	Amir abad	Chah zool	Ebrahimi	Zoozan	Ghasem abad	Mahabad	Bimorgh	Node pashang	Chah shoorak	Jangal	Feyz abad
Rodentia	Dipodidae	Allactaginae	<i>Allactaga elater</i>															
	Cricetidae	Cricetinae	<i>Cricetulus migratorius</i>							X	X	X	X	X	X	X	X	X
		Arvicolinae	<i>Ellobius fuscocapillus</i>							X	X	X						
	Rodentia	Muridae	Gerbillinae	<i>Tatera indica</i>	X	X				X								
				<i>Gerbillus nanus</i>														
				<i>Meriones crassus</i>			X	X	X									
				<i>Meriones libycus</i>									X					
			<i>Meriones persicus</i>									X						
			<i>Meriones meridianus</i>															
			<i>Rhombomys opimus</i>															
Murinae			<i>Mus musculus</i>							X	X	X	X	X	X	X	X	X
<i>Nesokia indica</i>																		
Lagomorpha	Ochotonidae		<i>Ochotona rufescens</i>															
Soricomorpha	Soricidae	Crocidurinae	<i>Crocidura gmelini</i>							X	X	X						

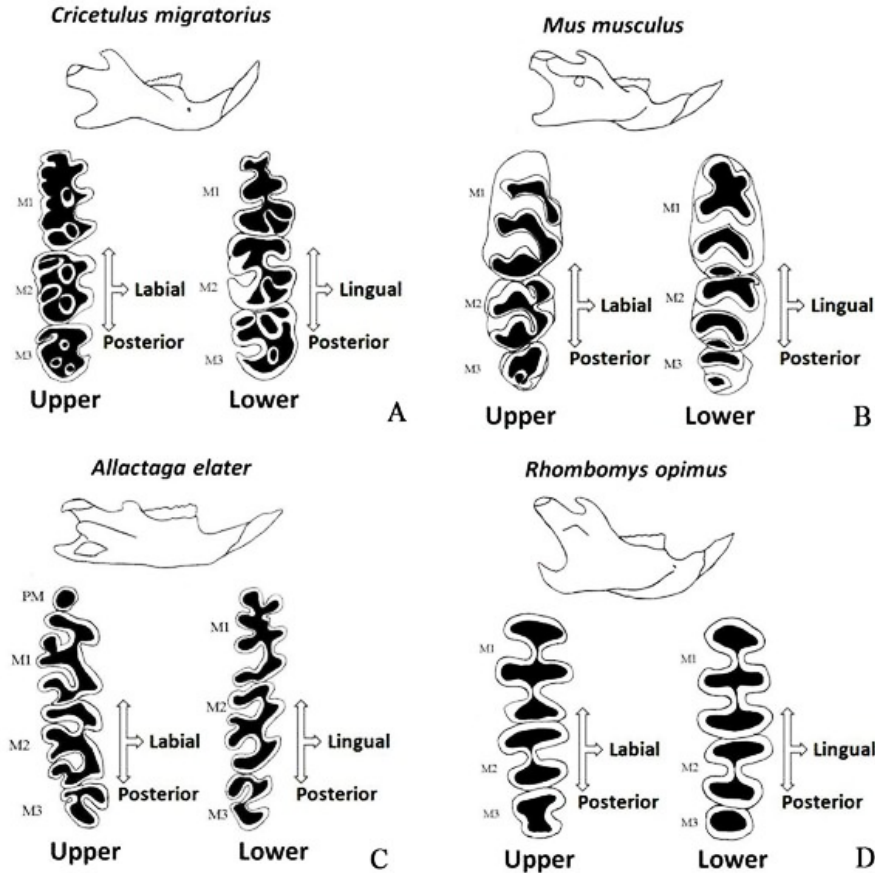


Figure 2. Mandible, upper and lower teeth of: *Cricetulus migratorius* and *Mus musculus* (common species) and *Allactaga elater* and *Rhombomys opimus* (uncommon species) founded in pellets.

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