# Rodents of Qiddiya, Southwest Riyadh, Saudi Arabia

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Abastract: Rodents play a crucial role in ecosystems, serving as indicators of biodiversity richness and as essential components of the food web. They serve as prev for many carnivorous mammals, snakes, and birds. A study on rodent diversity was conducted in Qiddiya, southwest of Rivadh-Saudi Arabia, near the Tuwaiq Mountain range. A total of 410 Sherman live traps were evenly distributed across forty-one sites to ensure comprehensive coverage of the area and its diverse landscapes. Over 2460 trap-nights, 270 individuals were captured representing eight species from two families. Notably, a small population of S. calurus was documented for the first time in Jabal Al Tuwaiq. This finding underscores the need for further fieldwork and research to enhance the understanding of rodent diversity and distribution in the region.

### Keywords: Rodents, Qiddiya, Saudi Arabia

# Introduction

Rodents are the largest order of mammals with c. 1,500 species. They are distributed world wide and in most ecosystems and urban areas (Wilson et al., 2016, 2017). Rodents play an important role in the ecosystem by dispersing seeds, providing food for many carnivores, and providing shelter for numerous fauna species that use their abundant burrows (Davidson et al., 2008, Whiteford and Kay 1999). Despite their ecological significance, rodents are relatively understudied compared to other faunal groups in the Kingdom of Saudi Arabia. This can be attributed to their shyness and elusive nature as nocturnal small mammals. Harrison and Bates (1991) documented the rodents and their distribution in the Kingdom of Saudi Arabia in their publication, "Mammals of Arabia." Recently, Al Malki *et. al* (2024) reported the presence of twenty species of rodents within four families from Saudi Arabia.

Despite these efforts, information on rodents in Riyadh Province remains notably scarce. A study on the Pharaoh owl (Bubo ascalaphu) pellet in Eastern Saudi Arabia documented eleven species of rodents belonging to two families Dipodidae, Muridae (Abi-Said et al., 2020). Notably, a 2016 ecological study at Wadi As-Sulai - Riyadh identified sixteen mammal species, predominantly from the Rodentia family (Abi-Said and Al-Zein, 2022). This emphasizes the need for further research to enhance the understanding of Rivadh Province's mammalian diversity in general and rodents in particular. This study investigated the rodent diversity in the Qiddiya site in southwest Riyadh Province-Saudi Arabia, at the borders of Jabal Al Tuwaiq.

# Materials and Methods

# **Description of Study Site**

The study area is divided into two parts: The upper plateau, which is part of the Tuwaiq mountain, consists of rocky areas made of fossilized corals with high mountain cliffs, and the lower plateau which is made of a gravel-stoney-sandy desert with scattered plants with several wadies and streams. These wadis act as channels for rainwater; hence, they have a rich diversity of flora, mainly Acacia trees with numerous plant species. In addition, at the foot of the high mountains, another landscape appears and is made of big and small fallen rocks. Moreover, during the rainy season, some depressions become filled with water in addition to the artificial reservoirs. Nonetheless, these water collection places do not last long due to great sunlight intensity.

#### **Trapping effort**

The rodent survey was conducted during October, and December of 2023 and January, March, April, and May of 2024, with the site systematically divided into three different quadrats to ensure comprehensive coverage (Figure 1).

Locations of the rodent traps were initially identified using Google Earth and were later verified during the field visits. Traps were placed near accessible locations due to the challenging terrain. This approach did not compromise the assessment. Fortyone trapping stations were deployed in each month of the survey (Figure 2). At each station, ten Sherman live rodent traps, five meters apart from each other, were baited with a mix of peanut butter, oats, sunflower seeds, and canary feed mix. The traps were set at dusk and were checked the next day at dawn. The captured animals were identified on-site, recorded, photographed, and were then released.

#### Results

The survey resulted in trapping and spotting 270 individuals belonging to eight species of the order Rodentia, including one species of the family Dipodidae and seven species of the family Muridae, five of which belong to the sub-family Gerbillinae.

Table (1) shows the number of species and the percentage of observation over the study period. The lowest number of species was recorded in November 2023, with only four species observed, and the percentage of observations for that month was 4.83%, the lowest across all observations. This is most likely related to the season being winter



Figure 1. The three quadrates of the site



Figure 2. The locations of the rodent trapping stations

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lable	1:	Number of ro	dent species	observed and	the percentage	of observed	rodents j	per month of the fieldwork	Κ.

	October	November	January	March	April	May
Number of rodent species	5	4	8	7	7	7
Percentage of observed rodents	8.55	4.83	17.10	23.42	25.28	21.19

during which less activity is expected. The highest number of species (eight species) was recorded in January 2024. This is associated with the start of the active and breeding season. The highest percentage of observations was recorded in April 2024 at 25.28%, the highest across all observations). This can mainly be attributed to the start of the reproduction season, food availability, and good weather; most of the young were trapped during this month.

The family Dipodidae is represented by one species, namely the three-toed jerboa (*Jaculus loftusi* (Blanford, 1875)) (Figure 3A). They were encountered during each night drive at different locations throughout the site in the lower plateau on open sandy plains but not in the upper plateau

since it is a rocky area with unsuitable habitat. The distribution of jerboa is shown in Figure 5. Similarly, this species was reported to be very common in Saudi Arabia (Al Malki *et al.*, 2024). The subfamily Gerbillinae is represented by five species *Gerbillus nanus*, *Gerbillus dasyurus*, *Meriones crassus*, *Meriones libycus*, and *Sekeetamys calurus*. Their distribution is shown in Figure 5.

Baluchistan gerbil (*G. nanus*, Blanford, 1875) (Figure 3B) was found in the lower plateau in an open sandy area where they can dig their burrows easily to hide during daytime. This species was common on-site and represented 20.74% of all the rodents observed (Table 2). This species lives alongside *M. libycus*.



**Figure 3**. The three-toed jerboa (A) encountered during a night drive, the Balochistan gerbil(B), the Wagner's gerbil (C), the Sundevall's jird (D), the Libyan jird (E), and the bushy-tailed jird (F) caught by Sherman live rodent traps.



**Figure 4.** The Arabian spiny mouse (A) and The golden spiny mouse (B) caught by Sherman live rodent traps. **Table 2:** Percentage of rodent species encountered in the study area.

	October		November		January		March		April		May		Total	
	Ν	% Obs.	N	% Obs.	N	% Obs.	N	% Obs.	N	% Obs.	N	% Obs.	Ν	% Obs.
Family: Dipoididae														
J. loftusi	4	17.39	1	7.69	4	8.69	10	15.87	5	7.35	2	3.51	26	9.63
Family: Muridae, Subfamily Gerbillinae														
G. nanus	5	21.74	4	30.77	7	15.22	10	15.87	21	30.90	9	15.79	56	20.74
G. dasyrus	1	4.35	0	0	2	4.35	5	7.94	5	7.35	4	7.02	17	6.29
M. crassus	0	0	0	0	1	2.17	0	0	0	0	0	0	1	0.37
M. libycus	6	26.09	7	53.85	14	30.43	19	30.16	15	22.1	11	19.29	72	26.67
S. calurus	0	0	0	0	1	2.17	1	1.59	0	0	0	0	2	0.74
Family: Muridae														
A. dimidiatus	7	30.43	1	7.69	15	32.61	13	20.63	16	23.5	23	40.35	75	27.78
A. russatus	0	0	0	0	2	4.35	5	7.94	6	8.82	8	14.03	22	7.78

Similarly, Scott and Dunstone (2000) and Strauss *et.al.*, (2008) reported the presence of *G. nanus* along with *M. libycus*. In addition, this species was reported in the Riyadh Province (Abi-Said and A-Zein 2022) and is distributed in the Kingdom of Saudi Arabia (Al Malki *et.al.*, 2024).

Wagner's gerbil (*G. dasyrus*, Wagner, 1842) (Figure 3C) was found in both the lower and upper plateaus but was less common than *G. nanus*. It represented 6.29% of all rodent

observations (Table 2). They were trapped in different habitats ranging from agricultural lands to wadies to mountainous rocky areas. Contrary to expectations, this species was reported to be very common in Saudi Arabia (Al Malki *et al.* 2024) but it was less represented in Qiddiya.

The Sundevall's jird (*M. crassus* Sundevall, 1842) (Figure 3D) was the least common. Only one individual was trapped in the upper plateau. Even though this species



Figure 5. Distribution of rodents in the study area.

is very common in Saudi Arabia, it was less represented in Qiddya. This could be attributed to the scarcity of its habitat. Buttiker and Harrison (1982) mentioned that this species favors sabkhas and alluvial wadi beds which are uncommon in that site.

Libyan jird (*M. libycus* Lichtenstein, 1823) (Figure 3E) was very common in the study area. It represented 26.67% of all observed rodents (Table 2). The Libyan jird was trapped in the upper and lower plateaus and was seen during daytime and night drives. They inhabit open sandy areas where they dig many burrows for fast escape from predators. Similarly, this species was reported to be very common in Saudi Arabia (Harrison and Bates 1991, Al Malki *et al.*, 2024)

Finally, the Bushy-tailed jird (*S. calurus* Thomas, 1892) (Figure 3F) was trapped for the first time in Qiddiya. This is the first record for this species from Jabal Al Tuwaiq. This species inhabits rocky areas and was trapped only in the upper plateau between and under the rocks. Besides, this species

was not common. It only represented 0.74% of all observed rodents (Table 2). It is known from a few places in Saudi Arabia (Nader, 1974, Abi-Said et al. 2020, Buttiker and Harrison 1982).

Family Muridae is represented by two species *Acomys dimidiatus* (Cretzschmar, 1826) and *Acomys russatus* (Wagner, 1840); their distribution is given in Figure 5.

The Arabian spiny mouse (*A. dimidiatus*) (Figure 4A) was found in both the upper and lower plateaus, in particular in rocky areas, bare lands or lands with trees and shrubs. This species was the most common. It represented 27.78% of all observed rodents (Table 2). This species is also common all over the kingdom in mountainous and rocky areas (Abi-Said *et.al.* 2020, Masseti 2010, Asiry and Fetho 2014).

The habitat of the Golden spiny mouse (*A. russatus*) (Figure 4B) is similar to that of the Arabian spiny mouse. The Golden spiny mouse was trapped in both the lower and upper plateaus, in rocky hills and terrains.

It was also encountered during daytime feeding among rocks. Nonetheless, it was not common on-site. It represented only 7.78% of all observed rodents (Table 2). In Saudi Arabia, this species was reported in few areas including the Riyadh Province (Abi-Said *et. al.* 2020, Alanazi *et al.* 2019), Wadi Liya (Vesey-Fitzgerald 1953), and Wadi Khumra (Vesey-Fitzgerald 1982)

#### Discussion

Rodents play a major role in the food chain. Their presence is crucial for the existence of many species. Their abundance and diversity reflect the richness of the ecosystem biodiversity since they are preyed upon by different animal species, including owls, birds of prey, and other carnivores. This study documented the rodent diversity in Qiddiya with a total of eight extant species representing 40% of the rodent fauna of the Kingdom of Saudi Arabia. This number is relatively high compared to other observations in other areas of the study site. This high diversity in such a relatively small area is probably due to the habitat and landscape diversity that consists of rocky landscapes, wadis, and plain sandy areas. Similarly, Horvath et al. (2001) reported that habitat heterogeneity positively affects species richness in The Lagos de Montebello National Park in Mexico. Likewise, in the Thousands Oak California habitat, heterogeneity had a direct effect on rodent species richness (Johnson and Karels 2016). Habitat preference was observed for most trapped species. Meriones libycus and Gerbillus nanus occurred in sandy wadies close to the sparse vegetation, while Acomys russatus and Acomys dimidiatus were restricted to rocky areas. In addition, Sekeetamvs calurus was found in a mountainous rocky area. Jaculus loftusi was widely distributed across the lower plateau where flat sandy areas prevailed. These results coincide with the findings of Abu Baher and Amr (2003), Amr et al. (2018), and Abed (2015).

The presence of the small population of

the bushy-tailed jird (*S. calurus*) is the first record from Jabal Al Tuwaiq. Hence, it is important to protect this small and isolated population and to consider the places where it was trapped as a critical habitat. As for the rest of the rodents, they are very common, and none raises conservation concerns. This study highlights the importance of continued investigations and fieldwork to document the fauna and its distribution in the Kingdom of Saudi Arabia.

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