

## Rodents Diversity in Wadi As Sulai, Riyadh Province, Kingdom of Saudi Arabia

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Received: June 2, 2022; Revised June 25, 2022; Accepted: June 30, 2022

**Abstract:** The rodents of Ar Riyadh Province, Kingdom of Saudi Arabia are not well documented. Twenty Sherman live traps were distributed in 23 sites along Wadi As Sulai in Ar Riyadh Province between February and April 2016 as a part of an ecological survey for the area. Nine species of rodents belonging to two families were caught four of which were reported for the first time at the species level in Ar Riyadh Province namely, *Gerbillus dasyurus*, *Gerbillus cheesmani*, *Gerbillus nanus*, and *Meriones crassus*. External, cranial, and dental measurements were recorded.

**Keywords:** Rodents, Dipodidae, Muridae, Wadi As Sulai, Riyadh, Saudi Arabia.

### Introduction

Rodents are considered as pests and vectors of many zoonotic diseases. Nonetheless, rodents play important ecological roles that are vital for the sustainability of ecosystems. Rodents are keystone species in many ecosystems controlling the ecosystem's structure and affecting vertebrate and invertebrate species richness (Brown and Heske, 1990; Delibes-Mateos *et al.*, 2011). They constitute an important prey base for a large number of predators in addition to being seed disseminators and forest regenerators (Orrock *et al.*, 2004; Howe and Brown, 2000). Moreover, rodents play important ecological roles in desert ecosystems (Reichman, 1979). Hence studying rodent distribution and their existence in an ecosystem will lead to better understanding of the ecosystem.

Few studies on rodents have been conducted in Saudi Arabia (e.g. Harrison, 1972;

Buttiker and Harisson, 1982; Al-Rajhi *et al.*, 1993; Al-Ahmed and Al-Dawood, 2001; López-Antoñanzas and Sen, 2006; Strauss *et al.*, 2008; Henry and Dubost, 2012; Sarli *et al.*, 2016). Harrison and Bates (1991) reported 46 rodent species (excluding the Sciuridae and the Hystricidae) in the Arabian Peninsula, twenty-two species of which are present in Saudi Arabia. According to the first Saudi Arabian National Report on the Convention on Biological Diversity, 22 species and subspecies of rodents belonging to fourteen genera and five families exist in Saudi Arabia and five of which are endemic to Saudi Arabia (*Gerbillus cheesmani arduus*; *Meriones rex philbyi*; *Meriones crassus longifrons*; *Meriones libycus arimalius*; *Psammomys obesus diana*) (Abu Zinada *et al.*, 2003). Lewis *et al.* (1963) reported eight rodent species from Northern Saudi Arabia, Al Kalili (1984) documented five species of rodents from the southwest of Saudi Arabia. Very few assessments examined rodents in Ar-Riyadh Province. Four species belonging to two families were reported from Ar Riyadh city (Al-Rajhi *et al.* 1993) and Al-Ahmed and Al-Dawood (2002) collected six species from Wadi Hanifah, which is parallel to Wadi As-Sulai in Riyadh city where the current study was conducted.

Wadi As-Sulai is a new project that surrounds Ar-Riyadh city parallel to Wadi Hanifa. It represents a man-made drainage system for rainwater drainage around Riyadh city. No studies on rodents were conducted on this site. Hence Rodents were studied in this area as a part of an environmental impact assessment study for the Wadi. Most recently, Abi-Said *et al.* (2020) reported on the presence of at least 11 species of rodents

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based on remains from pellets of the Pharaoh Eagle Owl *Bubo ascalaphus*. This study aims to augment the information on rodents in Ar-Riyadh Province and to highlight the effect of the drainage system on their population.

## Material and Methods

### Area description

The area of Wadi As-Sulai is a representative of the desert ecosystem sheltering typical desert life forms. It is part of the Kharj drainage basin, is an ephemeral waterway that collects runoff water from more elevated areas surrounding it. Water draining into the wadi comes from the natural watershed (2,550 km<sup>2</sup>), which includes Eastern Riyadh, with additional inputs from water treatment plants; the water is ultimately lost in the desert. Wadi As-Sulai stretches for ca. 120 km from north to south, its width sometimes only a few meters. It is comprised of habitats that range from semi-natural to widely disturbed, the major disturbances being grazing, pollution (discharge of partially treated and crude wastewater, construction wastes, litter, etc.), urbanization, and off-road driving. Fencing in the airport area as well as the National Guard area has partially excluded people and their animals; thus, these areas are more densely vegetated than adjacent areas. Apart from seasonal water bodies, the Wadi includes some sand/silt pans in addition to semi-permanent and permanent water bodies, some filled with treated or partially treated wastewater.

### Rodent trapping

The trapping stretched from the February 3<sup>rd</sup> to April 12<sup>th</sup>, 2016. Twenty-three sites covering all the Wadi were selected for rodent trapping using 20 Sherman live traps for one night per site (Figure 1).

Due to the limited number of traps, three stations were selected per night. In each station, twenty traps baited with peanut butter, oat, sunflower seeds, and canary feed-mix were

set at dusk and were checked the next day at dawn. Traps were arranged in line transects close to burrows. The caught animals were identified according to Harrison and Bates (1991), measured, photographed, skinned and skulls were cleaned and measured. All animals were taken as specimens and kept at the Department of Life and Earth Sciences collection, Lebanese University.

## Results

A total of 460 trapping nights resulted in trapping 62 individuals belonging to nine species belonging to two families (Table 1, Figure 2). The conservation status of all trapped species were of least concern (LC) according to IUCN redlist 2016. The most trapped rodent was *Acomys dimidiatus* (30.65%) followed by *Meriones libycus* (27.42%) and the *Gerbillus* spp. were the least trapped (Table 1). *A. dimidiatus* were caught in rocky areas while the *M. libycus* were caught in sandy areas while *Rattus rattus* and *Mus musculus* around urban areas.

**Table 1.** List of rodent species and their trapping percentage at Wadi As Sulai

Family	Scientific Name	N	%
Dipodidae	<i>Jaculus jaculus</i>	6	9.68
Muridae	<i>Acomys dimidiatus</i>	19	30.65
	<i>Gerbillus cheesmani</i>	3	4.84
	<i>Gerbillus dasyurus</i>	1	1.61
	<i>Gerbillus nanus</i>	2	3.22
	<i>Meriones crassus</i>	8	12.90
	<i>Meriones libycus</i>	17	27.42
	<i>Mus musculus</i>	2	3.23
	<i>Rattus rattus</i>	4	6.45

External, cranial, and dental measurements of species caught were recorded (Tables 2 and 3).

## Discussion

During this rapid survey, nine species of rodents were identified (Table 1). Al-Ahmed and Al-Dawood (2002) identified six rodent species in Wadi Hanifah which is parallel to

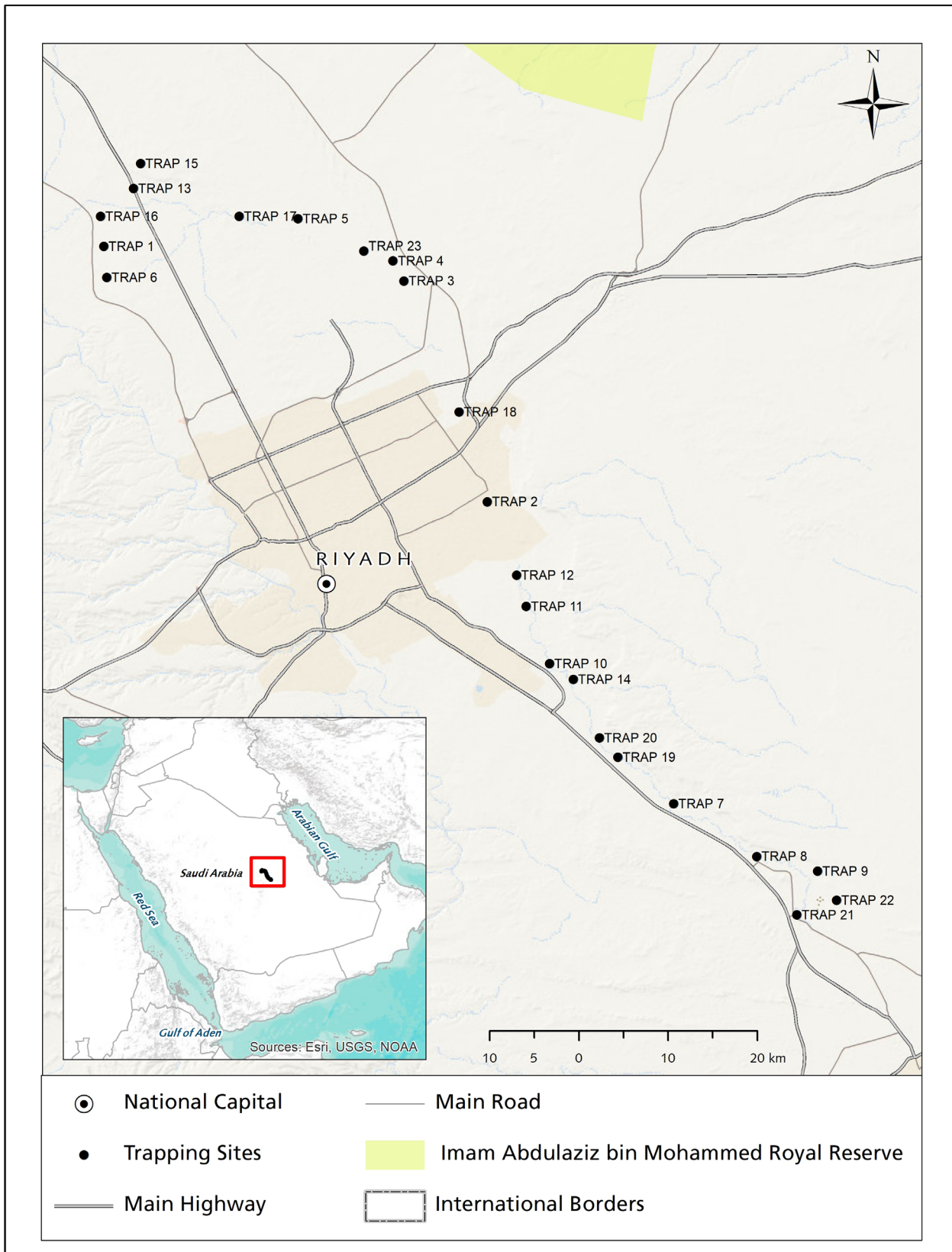


Figure 1. Trapping sites along Wadi As Sulai

**Table 2.** External measurements of the rodents trapped in Wadi As Sulai

Species	N	Wt. (g)	HB (mm)	TL (mm)	HL (mm)	HW (mm)	E (mm)	HF (mm)
<i>A. dimidiatus</i>	19	41.22	109.49	96.52	33.46	15.51	17.25	20.45
<i>D. dasyrus</i>	1	18	84.12	114.43	27.77	14.52	12.5	20.52
<i>G. cheesmani</i>	3	23.5	89.22	116.45	29.59	16.04	12.01	25.675
<i>G. nanus</i>	2	14.5	77.12	103.75	27.5	14.45	9.01	23.54
<i>J. jaculus</i>	6	48.5	114.21	168.16	34.07	25.79	19.66	60.72
<i>M. libycus</i>	17	146.1	167.2	156.5	44.1	23.5	17.3	41.38
<i>M. crassus</i>	8	80.33	126.88	138.73	38.13	21.29	14.01	33.78
<i>M. musculus</i>	2	7.6	65.66	69.85	21.21	10.42	12.72	18.51
<i>R. rattus</i>	4	161	184.14	185.84	39.98	21.71	24.93	35.45

**HB:** Head and body, **TL:** Tail; **HF:** Hindfoot; **HL:** Head length, **HW:** Head width, **E:** Ear; **Wt. g:** weight in grams

**Table 3.** Cranial and dental measurements of rodents trapped in Wadi As Sulai

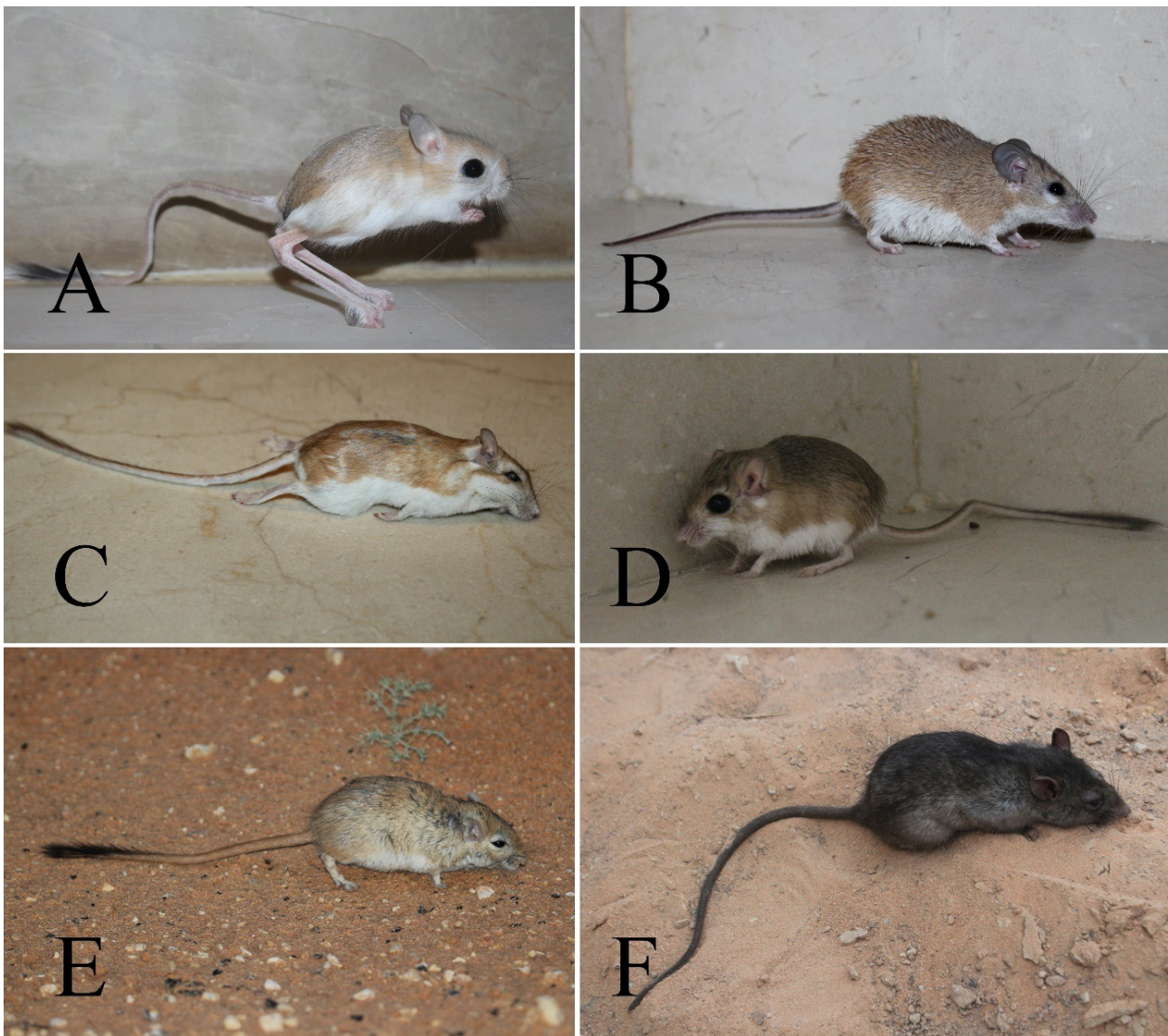
Species	N	IC	ZB	BB	GTL	CBL	MXC	MDC	M
<i>A. dimidiatus</i>	19	4.93	13.71	11.2	30.41	28.83	4.79	4.47	18.25
<i>D. dasyrus</i>	1	5.23	11.03	12.73	26.42	23.32	3.79	3.13	14.22
<i>G. cheesmani</i>	3	5.2	12.67	9.67	21.42	19.24	3.72	3.72	15.34
<i>G. nanus</i>	2	5.04	11.57	12.83	28.9	25.8	3.98	3.75	12.48
<i>J. jaculus</i>	6	11.01	20.61	22.5	31.9	28.1	4.65	4.46	18.7
<i>M. crassus</i>	8	5.86	15.34	13.23	30.86	28.53	5.24	5.12	19.06
<i>M. libycus</i>	17	6.85	17.4	14.61	36.82	34.43	5.54	6.57	20.36
<i>M. musculus</i>	2	3.59	9.01	7.94	NA	19.97	3.16	2.77	11.28
<i>R. rattus</i>	4	5.95	18.37	13.52	41.11	38.92	6.55	6.16	24.46

**GtL:** Greatest length of skull; **ZB:** Zygomatic breadth; **IC:** Interorbital constriction; **BB:** Brain case breadth; **MXC:** Maxillary cheekteeth; **MDC:** Mandibular cheekteeth; **M:** Mandible length (incisor included).

Wadi As Sulai these included *A. dimidiatus*, *M. libycus*, *M. musculus* and three subspecies of *R. rattus*. While El-Bahrawy and Al-Dakhil (1993) trapped seven rodent species in Ar Riyadh namely; *J. jaculus*, *A. dimidiatus*, *M. musculus*, *R. rattus*, *R. norvegicus*, and one *Meriones* spp, and one *Gerbillus* spp. Al-Rajhi *et al.* (1993) collected only four species *A. dimidiatus*, *M. libycus*, *M. musculus*, and *R. rattus*. This high number of species caught is probably due to the suitable season for rodent activity where a favorable climate prevails compared to the other study in Wadi Hanifah that was carried on between August and November when the weather is very hot. The high percentage of *A. dimidiatus* is owed to the suitable landscape of rocky structures where this species can hide easily. Similarly,

the high percentage of *M. libycus* caught is due to the spread of farmlands within the study site. Similarly, Al-Ahmed and Al-Dawood (2002) trapped more *M. libycus* in farmlands in Wadi Hanifah is also similar to the results reported by El-Bahrawy and Al-Dakhil (1993), Al-Rajhi *et al.* (1993) and Abi-Said *et al.* (2020).

Moreover, external, cranial, and dental measurements of species caught were similar to those reported by Harrison and Bates (1991) and Aulagnier *et al.* (2009). This study augments the rodent fauna in Ar Riyadh Province and highlights the importance of timing the trapping activity to match the activity of the rodents in the study site. This rapid survey identified four rodents that were not reported to the species level including;



**Figure 2:** A. The three-toed jarboa, *Jaculus jaculus*. B. Arabian spiny mouse, *Acomys dimidiatus*. C. Cheesmani gerbil, *Gerbillus cheesmani*. D. Wagner's gerbil, *Gerbillus dasyurus*. E. The Libyan jird, *Meriones libycus*. F. The black rat, *Rattus rattus*.

*G. cheesmani*, *G. dasyurus*, *G. nanus*, and *M. crassus*, and provided additional external and cranial measurements. Hence a comprehensive study to cover the entire Ar Riyadh Province is needed to document the small mammals present and their relative abundance.

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