

New Records of the Hotson's Jerboa *Allactaga hotsoni*, Thomas, 1920 (Rodentia: Dipodidae) from Khorasan and Yazd Provinces, Iran

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Abstract

A total of five specimens of *Allactaga hotsoni* were captured in Khorasan and Yazd provinces, Iran, in summer 2004 and 2005. The specimens are similar to those described previously from Baluchistan of Iran and Afghanistan. For the first time a karyological study was carried out to make a comparison with the other species. On the basis of karyological study there is not any significant difference in chromosome number from other species of *Allactaga* ($2n=48$, $NFa=92$). Previously this species was reported from Baluchistan and National Kavir Park near Siah-Kuhe. In this study *A. hotsoni* is reported for the first time from the study areas.

Keywords: Hotson's jerboa; *Allactaga hotsoni*; Dipodidae; Khorasan; Iran

Introduction

Thomas (1920) described *Allactaga hotsoni* from Baluchistan, Iran. *A. hotsoni* is distributed in Baluchistan of Iran [3,6], South Afghanistan [5] and West Pakistan [7]. This species was previously reported by Brown 1980 from Kavir National Park, near Siah-Kuhe. He caught three specimens of *A. hotsoni* from different sampling sites in National Kavir Park, near Varamin.

Ellerman (1961) separated *Allactaga hotsoni* from *A. elater* and *A. euphratica* by the proportionally larger bullar length of *A. hotsoni* to *A. elater* and *A. euphratica* [2,4]. But he also pointed out, apart from its exceptionally large bullae, this species is not very remote from *A. elater*, also Lay (1967) mentioned that it may be synonymous with *A. williamsi*.

Hassinger (1973) separated *A. hotsoni* from *A. elater* on the basis of differences in the index obtained by multiplying the distance in mm from the end of the nail of the fifth toe to the most distal edge of the third toe's plantar tubercle by the greatest transverse (dorso-ventral) diameter of this tubercle. Among species found in Iran, *Allactaga firouzi* mostly resembles to *A. hotsoni*, which is intermediate in size between *A. hotsoni* and *A. euphratica caprimulga*. *A. firouzi* is known only from the region of Shibar Pass in eastern Afghanistan.

A. hotsoni is recorded for the first time from Khorasan and Yazd provinces. Previously, it had been recorded only from its type locality, in Baluchistan of Iran, and National Kavir Park, Varamin [1]. So, there is not enough information on the geographic distribution and biology of Hotson's Jerboa in Iran. Present study,

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tried to represent some new data on systematic, karyology and geographic distribution of this species.

Material and Methods

Examined Material

Allactaga hotsoni, Iran: NW Bejestan, Qasem Abad; 34° 29' N; 57° 53' E (3) ZMFUM.

Allactaga hotsoni, Iran: N Yazd, Kharanagh; 32° 20' N; 54° 39' E (2) ZMFUM.

Allactaga elater, Iran: NW Bejestan, Qasem Abad; 34° 29' N; 57° 53' E (2) ZMFUM.

Three specimens of *Allactaga hotsoni* were caught from a sampling site at Qasem Abad, near Bejestan (34° 29' N; 57° 53' E) in summer 2004 and two specimens were caught from a site at Kharanagh, north of Yazd (32° 20' N; 54° 39' E) (Fig. 1). Skull and dental measurements were made using Nikon measuring microscope MM-40 and caliper accurate to 0.05 mm. All studied specimens were deposited in the Zoological Museum of Ferdowsi University of Mashhad (ZMFUM).

Chromosome spreads from the femoral and tibial bone marrow cells of the one hour vinblastin-treated specimens were prepared by flame drying method. About 20 metaphase spreads from each animal were examined at x100 magnification using an Olympus BH-2 microscope and photographed using a CCD camera (JVC) connected to a computer. The karyotype

was determined on the basis of five well-prepared metaphase spreads.

Results

Allactaga hotsoni Thomas, 1920

Allactaga hotsoni Thomas, 1920. 20 mi SW Sib, Kant (Kont), Persian Baluchistan (Corbet and Hill, 1991).

Description

Size was rather medium; tail was about 1.5 times longer than body and head length; color of upper parts was brown ochre which was mixed with coal in median parts; pelage was graded to a paler shade on the sides

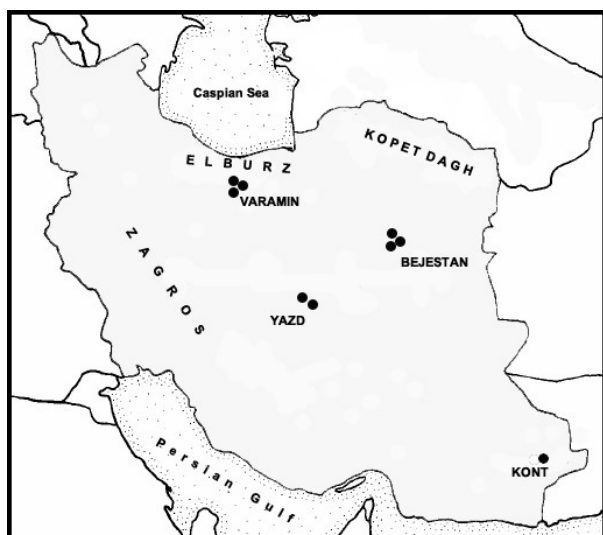


Figure 1. Geographic Distribution of *Allactaga hotsoni* in Iran. Sampling localities in National Kavir Park, Varamin (Brown, 1980) and Kont, Baluchistan of Iran, (Type locality; Thomas, 1920) are also shown on the map.

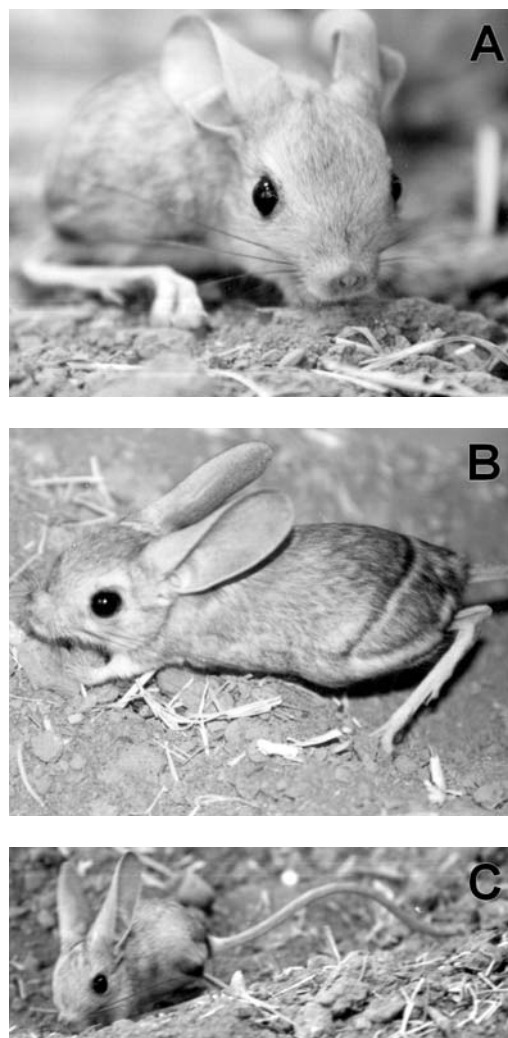


Figure 2. A-C: Male *Allactaga hotsoni* from Kharanagh, Yazd (ZMFUM-1277).

Table 1. Comparison of external and cranial measurements of *A. elater* and *A. hotsoni*

Character	<i>Allactaga hotsoni</i> (Khorasan)	<i>Allactaga hotsoni</i> (Yazd)	<i>Allactaga elater</i>
Total length	296 (1)	310-327 (2)	222-244 (2)
Head and body length	116 (1)	106-124 (2)	75-88 (2)
Tail length	180 (1)	193-204 (2)	147-156 (2)
Hind foot	50 (1)	59 (2)	40-42 (2)
Ear Length	40 (1)	44 (2)	26-28 (2)
Body Weight	75 g (1)	41-66 g (2)	24-32 g (2)
Mandibular tooth row	5.33-5.73 (2)	5.48-5.63 (2)	4.44-4.63 (2)
Maxillary tooth row	5.05-5.21 (2)	5.13-5.53 (2)	4.83-4.93 (2)
Zygomatic Length	13-13.2 (2)	12.95-14.00 (2)	10.75-11.17 (2)
Bullae Length	7.46-9.62 (2)	8.25-8.90 (2)	5.30-7.59 (2)
Bullae width	5.34-7.18 (2)	8.55-9.30 (2)	6.09-6.65 (2)
Condylbasal Length	26.60-27.70 (2)	27.70-29.10 (2)	22.63-23.66 (2)
Braincase width	15.07-15.90 (2)	16.15-16.40 (2)	15.06-15.20 (2)
Mastoid breadth	15.59-17.88 (2)	17.40-19.10 (2)	14.77-15.78 (2)
Rostrum Length	7.01- 8.49 (2)	9.30 (1)	6.59-7.38 (2)
Interorbital breadth	9.15-9.25 (2)	9.05-9.15 (2)	6.48-8.83 (2)
LM1/	1.97-2.10 (2)	1.97-2.07 (2)	1.79 (1)
LM2/	1.63-1.76 (2)	1.74-1.75 (2)	1.50 (1)
LM3/	0.86-0.97 (2)	0.90-0.97 (2)	0.753 (1)
WM1/	1.52-1.74 (2)	1.42-1.65 (2)	1.27 (1)
WM2/	1.41-1.60 (2)	1.30-1.67 (2)	1.32 (1)
WM3/	1.29-1.30 (2)	1.09-1.12 (2)	1.06 (1)
LM/1	2.00-2.22 (2)	2.04-2.24 (2)	1.88 (1)
LM/2	1.92-2.14 (2)	2.01-2.07 (2)	1.82 (1)
LM/3	1.25-1.54 (2)	1.31-1.36 (2)	1.05 (1)
WM/1	1.49-1.69 (2)	1.52-1.66 (2)	1.25 (1)
WM/2	1.70-1.77 (2)	1.51-1.76 (2)	1.34 (1)
WM/3	1.26-1.36 (2)	1.25-1.26 (2)	1.06 (1)

and flanks were lighter than dorsal parts; boundaries between color of flanks and white underparts were extremely distinct; ventrally, the body was covered with pure white hairs; tail was brown ochre dorsally, ventral surface had the same color; soles were naked and hairless; the second and fourth digits were covered with black hairs and the thirds were covered with white hairs; paws were naked and hairless; hind limbs with five and fore limbs with four digits; dorsal part of anterior end of tail had a yellowish distinct spot; distally the tail hairs lengthen to form a terminal tuft; the terminal tuft has an anterior indistinct white part, a median distinct black part and long whitish distal hairs; externally ears were covered with brown ochre hairs which were graded to

dark brown on the distal end (Fig. 2 A-C).

The skull was characterized by a narrow rostrum; nasals were short and in posterior end had a distinct concavity; lacrimals were short, narrow and rounded distally; tympanic bullae were large; the incisive foramina were long and wider distally; the palatal foramina were oval; maxillary and mandibular tooth rows were relatively short (Fig. 3 A-D).

Measurements

To make the comparison easier, 28 characters (Table 1) were measured for *A. hotsoni* caught from Khorasan and Yazd provinces and *A. elater* from Khorasan province.

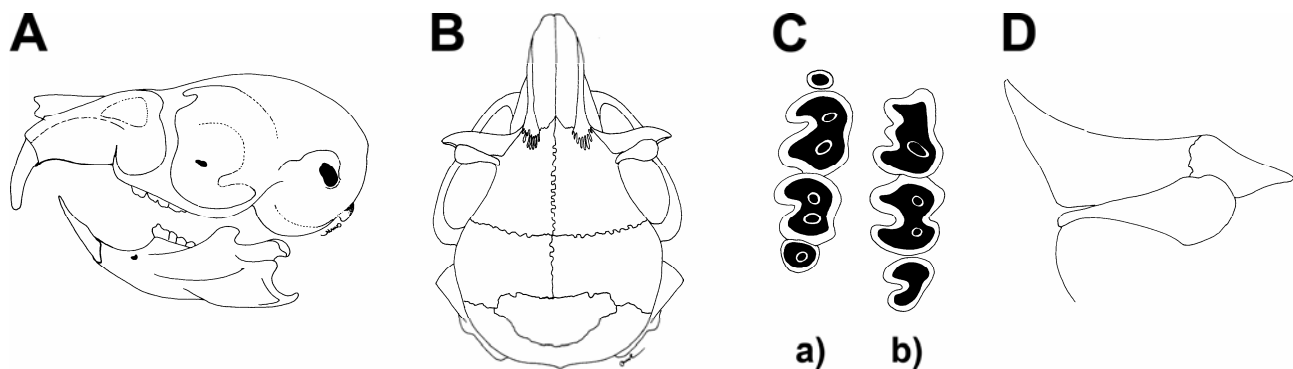


Figure 3. Skull morphology of *Allactaga hotsoni*. A) Skull and lower jaw, side view; B) dorsal view; C) Maxillary (a) and Mandibular (b) tooth rows; D) Lacrimal bone (right).



Figure 4. Chromosome spread of a female *A. hotsoni*.

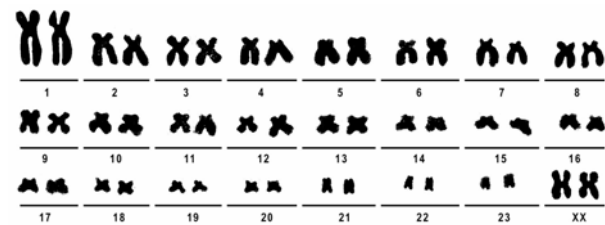


Figure 5. The karyotype of a female *Allactaga hotsoni* from Qasem Abad, Bejestan.

Karyology

$2n=48$, and $NFa=92$. There were three group of chromosomes based on their size. The first group consisted of eight large sized chromosomes (pairs 1 to 8). In this group the first chromosome was a large submetacentric chromosome. The second group (pairs 9 to 16) consisted of eight medium sized chromosomes and the third group (pairs 17 to 23) with seven pair of small chromosomes. The X chromosomes were large-sized metacentrics. The morphology of chromosomes is presented in Figures 4 and 5.

Discussion

Materials of present study were compared with *A. elater* which was caught from different localities of Khorasan province. *A. hotsoni* is distinguishable from *A. elater* by larger bullae length; distinctive trizonal terminal tuft and yellow ochre dorsal fur. Totally, there are slight differences between *A. elater* and *A. hotsoni* based on color and skull dimensions. Also, there are not any significant differences between karyotypes of these two species. As Zima (2000) mentioned, the genus

Allactaga has low karyotype variability, especially in diploid number of chromosomes. In rodents, Dipodidae along with Erinaceidae, Talpidae, Rhinolophidae and Sciuridae have low karyotype variability level [8, 10]. This karyotypic uniformity at the generic level has several reasons, phylogenetic age of this taxon, population dynamics and population structure. However, the degree of morphological similarity between different species of the genus *Allactaga* suggests that their distributions are of recent origin [9].

Brown (1980) reported that *A. hotsoni* was caught in more barren areas. He showed that there is a negative correlation between percent vegetation cover and Hotson's Jerboa occurrence. He also found that there is a significant correlation between the occurrence of *Allactaga hotsoni* and the halophytic chenopod, *Seidlitzia rosmarinus*. Hassinger (1973) also found *A. hotsoni* at elevations below 1000 m, whereas *A. euphratica* occurred at elevations between 1800 and 3200 m in Afghanistan. Womochel (1978) also reported that *A. hotsoni* occurred at elevations below 1000 m in clay-loess deserts with sparse, clumped vegetation, but, *Allactaga elater* lives in salty semiarid areas with various kinds of halophytes.

Acknowledgments

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References

1. Brown R.E. Rodents of the Kavir National Park, Iran. *Mammalia*, **44**(1): 89-96 (1980).
2. Corbet G.B. *The Mammals of the Palaearctic Region: A Taxonomic Review*. British Museum (Natural History), London, 314 pp. (1978).
3. Corbet G.B. and Hill J.E. *A World List of Mammalian Species*. 3rd Edition, Natural History Museum Publications, 243 pp. (1991).
4. Ellerman J.R. *The Fauna of India. Mammalia*, 2nd Edition, Vol. 3, Rodentia, Dehli (1961).
5. Hassinger J.D. A survey of the mammals of Afghanistan resulting from the 1965 street expedition (excluding bats). *Fieldiana Zoology*, **60**: 1-195 (1973).
6. Lay D.M. A study of the mammals of Iran resulting from the Street expedition of 1962-63. *Ibid.*, **54**: 1-282 (1967).
7. Roberts T.J. *The Mammals of Pakistan*. Ernest Benn Limited, London, 361 pp. (1997).
8. Shahin A.A.B. and Ata A.T.M. A comparative study on the karyotype and meiosis of the jerboas *Allactaga* and *Jaculus* (Rodentia: Dipodidae) in Egypt. *Zoology in the Middle East*, **22**: 5-16 (2001).
9. Womochel D.R. A new species of *Allactaga* (Rodentia: Dipodidae) from Iran. *Fieldiana Zoology*, **27**(5): 65-73 (1978).
10. Zima J. Chromosomal evolution in small mammals (Insectivora, Chiroptera, Rodentia). *Hystrix*, **11**(2): 5-15 (2000).