

New species of three-toed jerboa (Dipodidae, Rodentia) from the deserts of Khorasan province, Iran

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The present study introduces, for the first time, the black tail tip three-toed jerboa from the east of the Iranian Plateau. This new species is different from its sympatric species, *Jaculus blanfordi*, considering the clear black color of the hairs of its tail tip and the two large styles on the glans of the penis.

Key words: Three-toed jerboa, new species, Khorasan, Iran, Iranian Plateau.

INTRODUCTION

Among the rodents collected for the research projects on rodents fauna of east of Iran (years 1996-2000) - sponsored by National Science Council of Iran, three specimens of three-toed jerboa were found from Kavir-e-Namak, near Kashmar and Bandan in Khorasan Province, which had not been seen nor reported thus far. The specimens were then taken under detailed conventional studies and were found to belong to a new species of the genus *Jaculus*. The three-toed jerboa, *Jaculus*, is a large-sized jerboa found in desert biotopes. It has two subgenera, *Jaculus* with one species, *J.(J.) jaculus* which is without style on glans penis (Didier et Petter, 1960) and *Haltomys* with three species, *J. (H.) lichtensteini*, *J. (H.) orientalis*, and *J. (H.) blanfordi* (Corbet, 1978), with two styles on glans penis (Shenbrot, 1995) which so far are reported from Turkistan to Western Sahara.

The two species which are reported from Iran are *J. jaculus* and *J. blanfordi*, from South West and South and East of Iran, respectively (Lay, 1968; Corbet, 1978; Qumsieh and Mazin, 1996 and Panteleyev, 1998). Here we present taxonomic and zoogeographic data of this new species, *J.(H.) thaleri*, from deserts of Khorasan Province.

MATERIAL AND METHODS

Sampling was carried out by using car light and a large insect net. A total of 18 specimens of three-toed jerboa, *Jaculus* (16 being *J. blanfordi*) were collected during field work. Ten specimens were caught in south of Bozmayeh mountains in Kavir-e-Namak, Kashmar (Jafarabad 35 00 N and 58 05 E) north of Khorasan province and eight specimens were caught in Kavir-e-Lout, in the South East of Bandan (31 24 N and 60 44 E) (Fig. 1). The study is based on cranial and dental variables and five standard external measurements. Abbreviations used are: Hinfo: height of the infraorbital; LZ: zygomatic length; LCB: condylobasal length; LBul: length of bullae; SIO: interorbital breadth; LM:

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FIG. 1. – Sampling localities

length of maxillary tooth row; SM: mastoid breadth.

Cranial measurements were performed using digital caliper accurate to the nearest 0.05 mm. Standard external measurements were taken with ruler accurate to the nearest millimeter (Bl: body length; TL: tail length; Fl: foot length; EL: ear length). The karyotypes were prepared by the method of Dutrillaux and Couturier (1981).

SYSTEMATICS

Jaculus thaleri new species

ACRONYMY: ZMF: Zoological Museum, Ferdowsi University of Mashhad.

HOLOTYPE: ZMF-992, adult female, Kavir-e-Namak, Kashmar (Jafarabad 35 00 N and 58 05 E), Khorasan Province, Iran, 1998.

PARATYPES: ZMF-948, adult male and ZMF-1113, adult female, both from North East of Kavir-e-Lout, Bandan (31 24 N and 60 44 E) near Afghanistan border (Fig. 1).

TABLE 1.– Selected measurements (in mm) of *Jaculus thaleri*. The selected characters are those by which the new species discriminates from the other species of this genus (see the text for abbreviations)

Character	<i>Jaculus thaleri</i> (N= 2)	<i>Jaculus blanfordi</i> (N=16)
HI	137 (112–161)	121.8 (114–128)
TI	166.6 (140–172)	194 (183– 206)
EI	22 (13–30)	22.4 (20–24)
Hf	64.3 (54–74)	66.9 (65–68)
LM	5.3 (5.3–5.4)	4.9 (3.45–5.0)
Hinfo	7.4 (7.1–7.7)	6.8 (6.0–7.0)
LZ	14.2 (12.4–16.2)	12.3 (9-13)
LCB	32.7 (32.4–33.2)	31.8 (23-34)
LBul	14.5 (13.7–15.3)	12.8 (11-14)

MEASUREMENTS (in mm) OF HOLOTYPE: TL: 315; TL with terminal brush: 175; BL: 140; FL: 66; EL: 18; SIO: 12.4; Hinfo: 7.1; HR: 7.6; LZ: 16.2; LR: 0.6; SM: 24; LCB: 32.4; LBul: 15.3. The measurements of the holotype and the paratypes are presented in Table 1.

GEOGRAPHIC RANGE: Known from the type locality Kashmar and Bandan in the south of Khorasan Province, Iran.

DESCRIPTION

In the new species, *Jaculus thaleri*, the bullae are relatively large, space between them at occipital (above foramen magnum) is about 48-52% of interorbital width, maxillary tooth-row 5.5-6.5 mm, hind foot length is less than 66 mm. The size is smaller than *J. blanfordi*, especially in ear, hind foot and tail length. The dorsal aspect of the tail is dark brownish gray and the ventral surface black and white. The proximal part of the tail is clothed with short hairs and the distal one third has a black tail flag with some white hair internally (Fig. 2). Bullae greatly inflated, mastoids appearing prominently in superior aspect of the skull (Fig. 3).

COMPARATIVE STUDY OF GLANS PENIS AND BACULUM

According to Vinogradov (Didier and Petter, 1960) all forms of *Jaculus* can be determined by morphology of penis. This author particularly emphasizes on the characteristics of the size of spine and the shape of baculum in family Dipodidae. The surface of penis in *J. blanfordi* is in part flat, with the very small spine. The penis bone or baculum which is a part of armature is elongated in anterior part with two long spines, relatively longer than in *J. thaleri*. The extremities of spine are fine. These two spines are rested on the bone on the soft parts.

The baculum in *J. thaleri* has the same shape as in *J. blanfordi* but in *J. thaleri* it is longer with a median slender constricted column. The dorsal surface has a proximal extremity which is wide with a convex base. In *J. blanfordi* the proximal extremity of baculum is relatively large and its upper surface is crescent-shaped with a notch in the center. This is not clear in *J. thaleri* (Fig. 4).

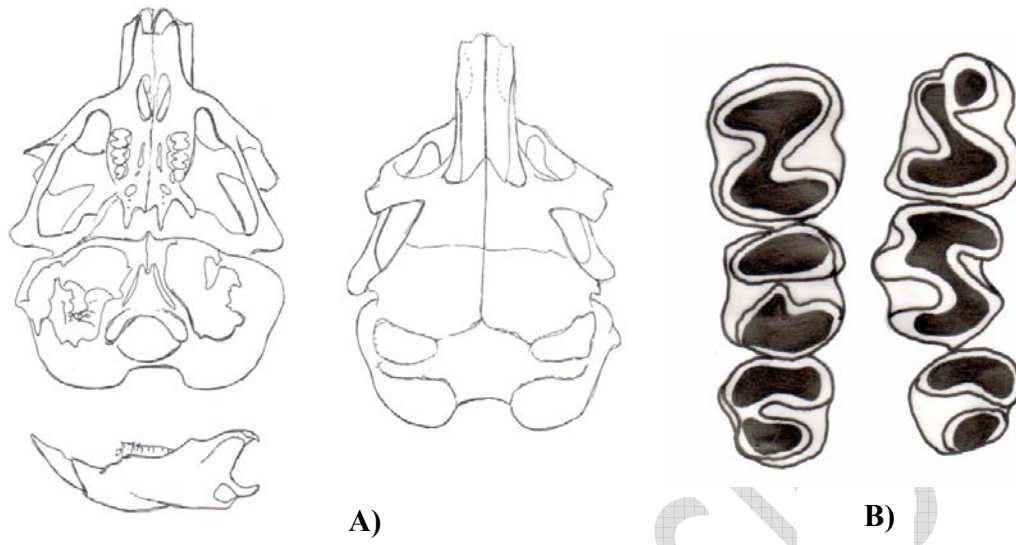


FIG. 3.— Skull (A) and molars (B) of *Jaculus thaleri* and Dorsal view of *J. thaleri* (C) and *J. blanfordi* (D).

TABLE 2.– Copamarison between the dimensions of the baculum in *J.thalери* and *J.blanfordi* (measurements in mm).

character	<i>J.thalери</i>	<i>J. blanfordi</i>
Total length	4.2	4.1
Width of proximal extremity	1.8	1.6
Width of distal extremity	2.02	1.9
Constriction width	0.28	0.25
Length of the anterior spine	3.75	3.94

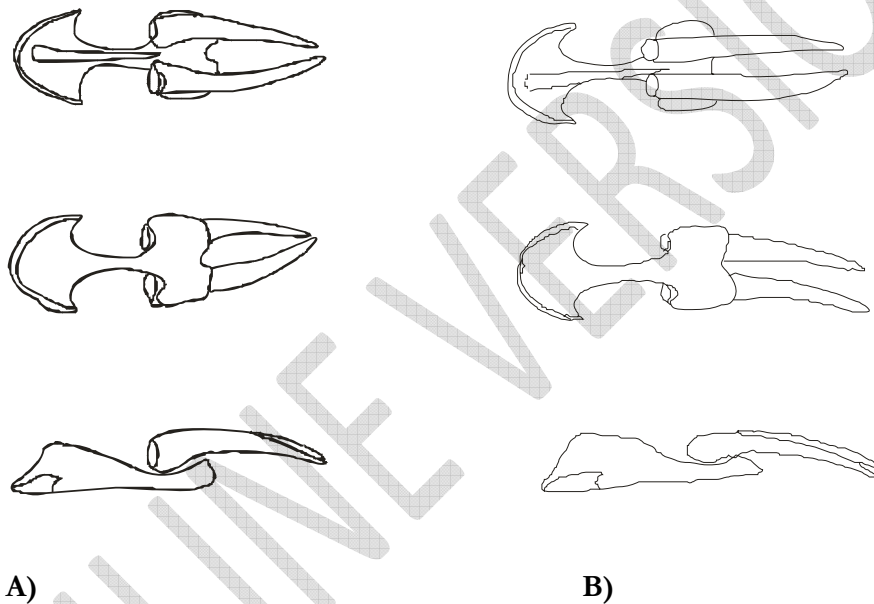
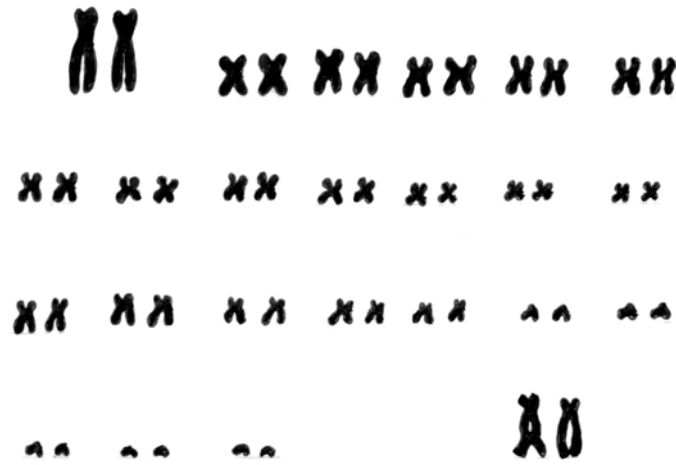


FIG. 4.– Shapes of Baculum and spine in A) *J.blanfordi* and B) *J.thalери*

KARYOTYPY

Chromosome spreads from the femoral bone marrow cells of the one hour Vinblastine-treated animals were prepared by air drying method, according to the method of Dutrillaux and Couturier (1981). With a slight modification, about 10 metaphase spreads from each animal were examined at x100 magnification and photographed under the microscope. The karyotype was determined on the basis of five to ten well-spread metaphase cells for each individual. Chromosomes were measured on enlarged photographs. Terminology for the description of the centromeric position on each chromosome follows Adel A.Basyouny Shahin and Mata (2001), considering a chromosome as metacentric if the ratio of the length of longer arm (P), shorter arm (Q) is equal to 1.00. However, it was considered subtelocentric if the ratio was higher than 1.79 and submetacentric if the ratio was higher than 1.00 and equal to or lower than 1.79. If the ratio is 0.00, a chromosome is considered

A)



B)



FIG. 5.— Comparison of Karyotype of *Jaculus thaleri* (A) and *J. blanfordi* (B).

telocentric (acrocentric). The chromosomes of both *J. blanfordi* and *J. thaleri* are 48 but in *J. thaleri* the number of metacentrics is 12, subtelocentrics 12, and submetacentrics 22. Sexual chromosome ratio is the same in two species. The X chromosome is large subtelocentric and the Y chromosome is small subtelocentric (Fig.5).

GEOGRAPHIC RANGE

Known from the type locality, Kashmar and Bandan in the south of Khorasan Province, Iran (Fig.1).

DISCUSSION AND CONCLUSION

The new species, *J. thaleri*, is closely related to *J. blanfordi* by skull characteristics and the very complex structure of penis. However, the white flag is absent in the tail of the new species, the styles of the penis are long and curved, the baculum is longer and karyotype is different from *J. blanfordi*. The discovery of this species in sympatry with *J. blanfordi* sheds new light on the zoogeography of *Jaculus* and the problem of speciation in this genus.

ETHYMOLOGY

The species name is referred to the name of the late professor Louis Thaler, the founder of the doctoral program in biosystematics and evolution in 1974 and ISEM (Institut des Sciences de l'Evolution et ses Mechanismes) in Montpellier University II, France, in 1978.

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