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A NEW KARYOTYPE OF *CALOMYSCUS* FROM THE KHORASAN PROVINCE, IRAN

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ABSTRACT - We report a new karyotype of *Calomyscus* from two localities of the Khorasan Province (Aghdarband, 36° 11' 3"N, 60° 44' 6" E and Khajemorad, 36° 8' 5" N, 59° 41' 58" E). Chromosomes were examined by conventional staining and C-banding techniques. The diploid chromosome number (2n) and the fundamental autosomal arm number (FNa) were 44 and 60 respectively. The autosomal set consisted of 12 pairs of telocentrics, 5 pairs of acrocentrics and 4 pairs of sub-metacentrics. Both heterosomes were small telocentrics.

Key words: Hamsters, systematics, distribution, C-banding

RIASSUNTO – ***Un nuovo cariotipo del genere* Calomyscus *dalla provincia di Khorasan, Iran.*** Si descrive un nuovo cariotipo appartenente al genere *Calomyscus*, scoperto in due località della provincia di Khorasan (Aghdarband, 36° 11' 3"N, 60° 44' 6" E e Khajemorad, 36° 8' 5" N, 59° 41' 58" E). I cromosomi sono stati analizzati con le tecniche standard di colorazione e bandeggio. Il numero diploide di cromosomi (2n) e il numero fondamentale di bracci autosomici sono risultati pari a 44 e 60 rispettivamente. Il set di cromosomi autosomici è composto da 12 paia di telocentrici, 5 di acrocentrici e 4 di sub-metacentrici. Entrambi i cromosomi sessuali si presentano come piccoli telocentrici.

Parole chiave: criceti, sistematica, distribuzione, bandeggio cromosomico

INTRODUCTION

The genus *Calomyscus* has been long considered monotypic and represented by the species *C. bailwardi*. (Ellerman and Morrison-Scott, 1951; Corbet and Hill, 1980). However, Vorontsov *et al*. (1979) treated most of the subspecies of *C. bailwardi* as distinct species, and Musser and Carleton (2005) recognized eight species, *C. bailwardi, C. hotsoni, C. mystax, C. tsolovi, C. urartensis*, *C. elburzensis*, *C. grandi*s and *C. baluchi*. The geographic distribution of these species is shown in Figure 1. They are strictly dependent on rocky habitats, which provide them with thermally isolated shelters such as crevices and other natural cavities (Malikov *et al*., 2001).

Multivariate analysis of morphological characters has demonstrated that morphological differences between species are associated with karyotypic varia-

tions (Lebedev *et al*., 1998). So far, within the range of the genus seven distinct karyotypes have been identified (Graphodatsky *et al*., 2000; Romanenko *et al*., 2007; Tab. 1). Since the taxonomic status of this genus remains somewhat controversial, karyological analysis may provide important information for evaluating the systematic position of *Calomyscus*. We report in this paper a new karyotype from the Khorasan province.

STUDY AREA AND METHODS

Nine *Calomyscus* specimens were collected between April and October 2006 from two different localities of the Khorasan Province (Iran): Khajemorad (36° 8' 5" N and 59° 41' 58" E, Elevation: 1260 m a.s.l.) and Aghdarband (36° 11' 3" N and 60° 44' 6" E, Elevation: 640 m a.s.l.). These localities are nearly 200 km distant (Fig. 1). The climate is cold and dry, rainfall mostly occurring during the long freezing winter.

Seven specimens were examined cytogenetically. Karyotypes were obtained from bone marrow cells according to the technique described by Baker *et al*. (1982). The C-banding treatment was performed as described by Sumner (1972). A total of 15 slides were prepared for each specimen, and well-spread metaphase cells were analyzed. The diploid number of chromosomes (2n) and the number of autosomal arms (FNa) were determined by examining photographs of the slides. The skins and skulls of these specimens are deposited in the Rodentology Research Centre at Ferdowsi University.

RESULTS AND DISCUSSION

The karyotype of *Calomyscus* specimens from the Khorasan Province showed 2n = 44 and FNa = 60, consisting of 5 pairs of acrocentrics and 4

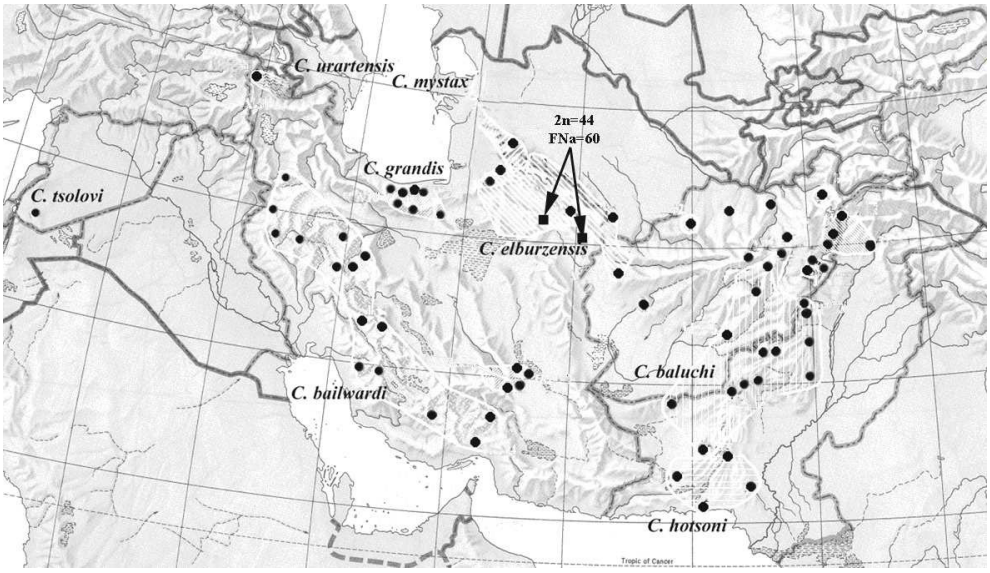

Figure 1 - Distribution map of *Calomyscus* as reported by various authors. The sampling localities of this study are marked by squares (■).

pairs of sub-metacentrics of decreasing size, from large to small, and 12 pairs of telocentrics. The sexual pair is formed by a small X chromosome, with a heterochromatic short arm, and by a small telocentric Y (Fig. 2).

The chromosome number of the known karyotypes varies from 2n = 30 to 2n = 52, and the number of arms (FNa) from 42 to 58 (Graphodatsky *et al*., 2000; Malikov *et al.,* 2001). *C*. *elburzensis* and *C*. *mystax* have both 44 chromosomes as the karyotype reported in this study. *C*. *elburzensis* has 8 pairs of subtelocentric autosomes and 14 pairs of acrocentric autosomes (FNa = 58). The X chromosome is an intermediate-sized submetacentric with a heterochromatic short arm, whilst the Y chromosome is completely heterochromatic. The karyotype of *C*. *mystax* includes 2 pairs of subtelocentric autosomes and 19 pairs of acrocentric autosomes (FNa = 46). Therefore, the comparison of the karyotype from the Khorasan province with the previously known karyotypes, suggests the probable existence of a new species of *Calomyscus* and raises to six the chromosomal forms described up to now for Iran (Tab. 1). Since chromosomal forms are not necessarily indicative of new species, further investigations are needed to evaluate the taxonomic status of the genus *Calomyscus*.

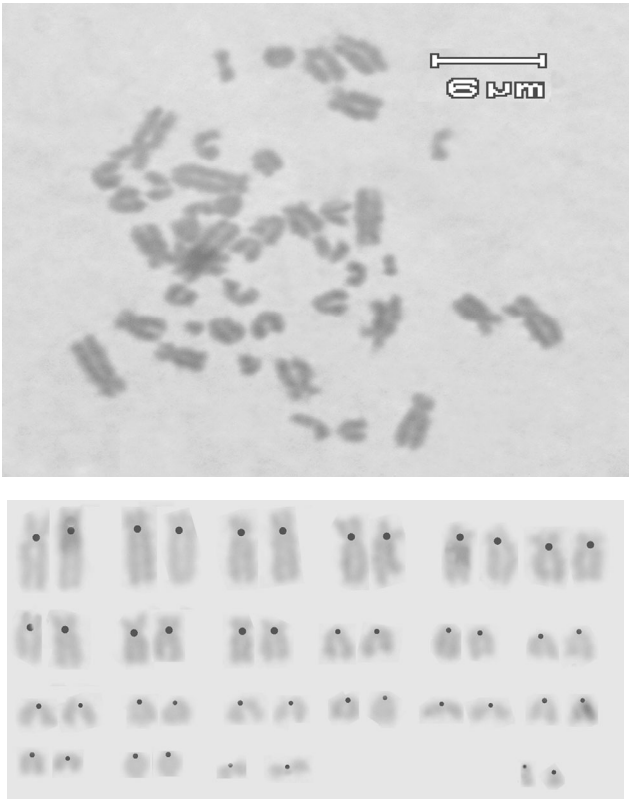

Figure 2 - Karyotype of *Calomyscus* from Khajemorad, Khorasan Province.

Table 1 - Chromosomal forms of the genus *Calomyscus*, (2n = diploid number; FNa = number of autosomal arms) according to Graphodatsky *et al*. (2000).

Species/Race (2N/FNa)	Locality	Region, country
C. uratensis Karyotype 1 (32/42)	Dzhulfa	Naxcivan, Azerbaijan
C. mystax Karyotype 2 (44/46)	Great Balkhan Mountains	Balkhan Region, Turkmenistan
	Tehran, lower station of the Telecabin Road	Tehran Province, Iran
C. elburzensis Karyotype 3 (44/58)	Fir'uza(14 km SW of Ashgabat) Chuli(36 km W of Ashgabat) Kalininsk Almadjik military point, 5 km S of Bakharden	Akal Region, central Kopetdag, Turkmenistan
	G'aurs (36 km E of Ashgabat) Archenyan military point	Akal Region, eastern Kopetdag, Turkmenistan
	Akar-Chashme military point	Mary Region, western Badkhyz, Turkmenistan
	AghMazarAbad (valley 20 km W of Kapkan)	Kopetdag, Khorassan Province, Iran
Karyotype 4 (30/44)	Summit of Mt. Dushak Chaek, 4 km SE from site No. 12	Akal Region, central Kopetdag, Turkmenistan
	Ai-Dere Gyzylarbat Danata	Balkhan Region, western Kopetdag, Turkmenistan
	Little Balkhan Mountains	Balkhan Region, Turkmenistan
Karyotype 5 (37/44)	Vicinity of Karambast and Khassanabad	Bakhtaran Province, Iran
Karyotype 6 (52/56)	Shah-Dad Tunnel	Kerman Province, Iran
Karyotype 7 (50/50)	Sivand	Zagros Mountains, Fars Province, Iran

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