Short Communication

A new cytotype for the El Carrizo deer mouse Peromyscus ochraventer

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Abstract

Peromyscus ochraventer is a rodent species endemic of Mexico. In 1981, Robbins and Baker described its karyotype from one single female which presented 2n = 48 and FN = 60. In this paper we describe the Y chromosome of the male and a new cytotype for the species, 2n=48, FN=58, that was identified in all of the collected specimens. The FN = 58 is due to one pericentric inversion in chromosome 6, as shown by G-banding pattern.

Abbreviations

2n: Diploid number; FN: Fundamental Number; m: meters; A: Acrocentric; B: Biarmed; B*: Biarmed with deletion

Introduction

El Carrizo deer mouse is a rodent endemic to the Sierra Madre Oriental, Mexico, which inhabits in humid forests between 400 and 1500 m, in three discontinuous areas of Tamaulipas and San Luis Potosí states [1]. P. ochraventer has been assigned to the mexican group of the genus Peromyscus based on morphological, anatomical and ecological traits [2-4]. In 1981, Robbins and Baker [5] described the karyotype of P. ochraventer from a female specimen collected in southern San Luis Potosí at the limit of its distribution, which had a diploid chromosome number 2n = 48 and a fundamental number FN = 60. The purpose of this paper is to describe a new cytotype found in specimens from three populations located in the north, center and south of the species distribution.

Methods

Thirty-five specimens were collected in 3 different localities: Tamaulipas, Rancho El Cielo, 5 ♂ and 4 ♀; San Luis Potosí, Maguey de Oriente 10 ♂ and 10 ♀, Copalillo 3 ♀ and 3 ♂ (Figure 1). Somatic metaphases were prepared according to Baker, et al. 2003 [6]. The diploid number, 2n, was determined by examining an average of 50 mitotic metaphases from each individual. Karyotypes were prepared with 5 mitoses of excellent quality from each organism, photographed with an Olympus 7.5X zoom digital camera and a Zeiss 100X microscope objective. The chromosomes were arranged according to the Peromyscus Chromosome Standardization Committee [7] and described following Patton’s classification criteria [8]. G-bands were obtained following the procedure of Wang and Federof [9]. The karyotype of this species was compared with that described by Robbins and Baker [5] and with those of some species that are part of the groups to which this rodent has been assigned.

Results and discussion

The 175 metaphases analyzed revealed that P. ochraventer showed a conservative karyotype along its distribution. The chromosomes and fundamental numbers found are 2n = 48 and FN = 58, respectively. Pairs 1, 2, 3, 9 were submetacentric, 4-8, 10-21 acrocentric and pairs 22, 23 were metacentric; the X chromosome was a large submetacentric. The Y chromosome resulted to be a small acrocentric one with two heterochromatic bands, one close to the centromere and the other in the distal part (Figure 2A). All of the specimens from the 3 populations examined in this study shared the same G-banding pattern (Figure 2B and 2C).

Citation: Sánchez IU, Angeles Aguilar Santamaría MDL, Gerardo López-Ortega M (2020) A new cytotype for the El Carrizo deer mouse Peromyscus ochraventer. Glob J Zool 5(1): 034-037. DOI: https://dx.doi.org/10.17352/gjz.000019
The karyotype reported here, like that of Robbins and Baker [5] presented the primitive condition of the *Peromyscus* genus with chromosomes 1, 22 and 23 biarmed but differs in the condition of par 6, resulting in the presence of 2 cytotypes for this species. Of the 36 specimens studied so far, pair 6 is acrocentric in 35 of them (this paper) and only in one it is submetacentric [2]. Based on the G-bands of pair 6, the difference between the two cytotypes can be explained by the occurrence of one pericentric inversion. In both karyotypes this chromosome has 4 bands but with different distribution. In that of Robbins and Baker [5], there is 1 band in the short arm and 3 more in the long arm. In the cytotype here described, the same 4 bands are in the long arm. Our results agree with Rogers, et al. [10] who reported that pericentric inversions are the most frequently chromosomal rearrangement found among the species of genus *Peromyscus*.

The common form of pair 6 is the Acrocentric one (AA) reported in *P. guatemalensis*, *P. gymnnotis*, *P. mexicanus*, *P. yucatanicus*, *P. zahrachys*, *P. furus*, *P. megalops*, *P. melanurus*, *P. nudipes*, *P. perforatus*, *P. melanophrys*, *P. gratus*, *P. difficilis*, *P. pectoralis*, *P. beatae*, *P. crinitus*, *P. polionotus* and *P. boylil* [1,10-21].

A second homomorphic form has been described: the submetacentric one (BB). In the cytotype of *P. ochraventer* described by Robbins and Baker [5] pair 6 shows this condition which is also found in *P. maniculatus* [14-16,22,23].

One heteromorphic condition of chromosome 6 (AB) is observed in *P. levipes* [18] and *P. maniculatus* [14-16, 22,23].

It has also been observed that chromosome 6 is prone to suffer other kind of rearrangements. In addition to pericentric

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**Figure 1:** Distribution map of *Peromyscus ochraventer* and locations where specimens were collected to prepare the karyotype.

**Figure 2:** New cytotype of *P. ochraventer*. 2A Karyotype of *P. ochraventer* with conventional staining. 2B G-Banding pattern of the new cytotype of *P. ochraventer*. 2C Ideogram with G bands.
inversions, several authors have reported that in some species deletions (B’) in the same pair have occurred giving rise to two more conditions: AB’ and B’B’. *P. manilcutus* [14–16], *P. ores* and *P. siketens* [1,10,19], show the first form (AB’); the second one has been registered in *P. melanotis* [14–16].

Greenbaum and Baker [14] reported that the centromere position in the Y chromosome is variable. In *P. ochraventer* this chromosome is acrocentric like in other species of the mexicanus group: *P. mexicanus*, *P. guatemalensis* and *P. zarhynchus* [19]. The G-banding pattern showed two bands, one in distal position and the other close to the centromere.

Along its taxonomical history, *P. ochraventer* was related most frequently to the mexicanus species group until this species was assigned to the incertae sedis position by Musser and Carleton [24].

Bradley, et al. [25] based on the mitochondrial cytochrome-b sequences analysis found that *P. ochraventer* is related to the group truei, more closely to the clade truei which include *P. gratus* and *P. truei* species. However, the taxonomic position of *P. ochraventer* remained uncertain.

The karyotype of the species of the truei group shows variation in the number of chromosomes with two arms ranging from 5 to 8. The cytotype of *P. ochraventer* described in this paper is similar to that of *P. gratus*, except for the biarmed pair 4 of this species [26]. Another similitude is the occurrence of more than one cytotype in *P. ochraventer* as it is reported for *P. nasutus*, *P. truei* [27] and *P. difficilis* [28]. Nevertheless, the karyotype of *P. ochraventer* here described is similar to the one found in the mexicanus group which is the same in all of the species included in this group [19].

We propose that the characteristic karyotype of *P. ochraventer* is the one described in this paper, whereas that reported by Robbins and Baker [5] based on a single female specimen can be considered as a polymorphism due to the variability of chromosome 6.

### Acknowledgements

We appreciate the support during field work to MVZ José Trinidad Sierra Guzmán, as well as to local authorities who kindly accompanied us to the collection sites: Ejido de Sta. Isabel, Tamps. Mr. Casiano Puga; Magey de Oriente, Mr. Rodrigo Méndez, Mr. Rosalio Méndez and Mr. Mario Martínez; and Mr. Vicente from Capallolio, S.L.P.

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