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Cariotipo de *Peromyscus grandis* (Rodentia: Criceidae)

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Abstract

Peromyscus grandis is a rodent whose distribution is restricted to the mountain ranges of central Guatemala. This note represents the first report of karyotypic data for this species. The karyotype (fundamental number = 58) closely resembles karyotypes of other species of *Peromyscus*.

Keywords: chromosomes, Cricetidae, endemic, karyogram, Peromyscus mexicanus group.

Resumen

Peromyscus grandis es un roedor cuya distribución está restricta a las montañas del centro de Guatemala. Esta nota es el primer reporte de datos cariotípicos para esta especie. El cariotipo (número fundamental = 58) resulta muy parecido al de otras especies de *Peromyscus*.

Palabras clave: cariograma, Cricetidae, cromosomas, endémico, grupo Peromyscus mexicanus

Introduction

Many species of rodents are endemic to the highlands of Mesoamerica (*i.e.* species of *Habromys*, *Microtus*, *Reithrodontomys*, and *Peromyscus*- Hooper 1952; Conroy *et al*. 2001; Carleton *et al*. 2002; Dawson 2005). Although this region is considered one of the biodiversity hotspots for conservation priorities (Myers *et al*. 2000), basic biological information for many Mesoamerican rodents remains unknown. The *P. mexicanus* group is among the most speciose and ecologically diverse species group within the genus *Peromyscus* (Carleton 1989), and to date species limits and phylogenetic relationships among taxa within the group are not well resolved (Rogers and Engstrom 1992; Bradley *et al*. 2007; Ordóñez-Garza *et al*. 2010). Although most species within this group have been shown to exhibit extreme karyotypic conservation with few taxa varying in their (sex) chromosome composition (Smith *et al*. 1986; Peppers *et al*. 1999). *Peromyscus*

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grandis is the only species within the *P. mexicanus* group for which chromosomal data are unavailable. Herein, the karyotype of *P. grandis* is described and compared with karyotypes of other closely related species of *Peromyscus*.

Material and Methods

Sampling. Individuals of *P. grandis* were lived-trapped from natural populations in Reserva Chelemhá, Alta Verapaz, Guatemala, 2,090 m, coordinates 15.3859 N and -90.0062 W. Voucher specimens and tissues samples were deposited in the National Museum of Natural History, Smithsonian Institution and the Natural Science Research Laboratory, Museum of Texas Tech University and are listed in Appendix I.

Chromosome data. Karyotypes were prepared under field conditions at Reserva Chelemhá, following the standard bone marrow technique of Lee and Elder (1980) as modified by Baker *et al*. (2003). At least five metacentric spreads were examined and photographed per individual and the diploid (2n) and fundamental numbers of autosomal arms (FN) were determined for each individual. Karyograms were initially constructed by arranging bi-armed chromosomes based on size (largest to smallest); inferences of homology were then made using the chromosomal morphology depicted in the Committee for Standardization of Chromosomes of *Peromyscus* (1977) and Greenbaum *et al*. (1994) and were compared to karyotypes and FNs previously reported for the *P. mexicanus* species group (Hsu and Arrighi 1986; Smith et al. 1986; Bradley and Ensink 1987; Peppers *et al*. 1999).

Results

Karyotypic data. Karyotypes were obtained from two individuals of *P. grandis* from Reserva Chelemhá, Alta Verapaz, Guatemala and 16 individuals of *P. mexicanus* from five localities in Honduras (see Appendix I). Comparison to the standard karyotype for *Peromyscus* (Committee for Standardization of Chromosomes of *Peromyscus* 1977; Greenbaum *et al*. 1994) using chromosomal size as a reference, revealed that *P. grandis* possessed six pairs of biarmed chromosomes (presumably pairs 1, 2, 3, 9, 22, and 23), a large sub-telocentric X, and a small acrocentric Y. The remaining autosomes are acrocentric (see Fig. 1a).

Discussion

Although the chromosomal data depicted herein are based on standard karyotypes (non-differentially stained), many inferences can be made relative to the G-banded datasets depicted in Greenbaum *et al*. (1994) and those pertaining to the *P. mexicanus* species groups (see below). The karyotype of *P. grandis* (2n = 48, FN = 58) resembled that described for other members of the *P. mexicanus* species group (Robbins and Baker 1981; Rogers *et al*. 1984; Stangl and Baker 1984; Smith *et al*. 1986; Peppers *et al*. 1999) examined to date, with two exceptions. First, Bradley and Ensink (1987) reported a FN = 56 karyotype for individuals of *P. m. saxatilis* from El Hatillo, Honduras. The karyotype of *P. m. saxatilis* appears to be missing chromosomal material above the centromere in the 3rd largest pair of chromosomes, leading Bradley and Ensink (1987) to conclude that it was acrocentric. *P. grandis* possesses a minute, but visible, amount of chromosomal

material above the centromere on the 3rd largest pair of chromosomes. To further examine this apparent discrepancy, we examined the karyotypes of 17 individuals of *P. m. saxatilis* collected from five localities in Honduras (Appendix I). All possessed a FN = 58 similar to that proposed for *P. grandis*. It is not known whether the FN = 56 form reported in Bradley and Ensink (1987) was a result of over contracted chromosomal material in *P. m. saxatilis*, population variation restricted to El Hatillo, Honduras, or if it represented a unique taxonomic character.

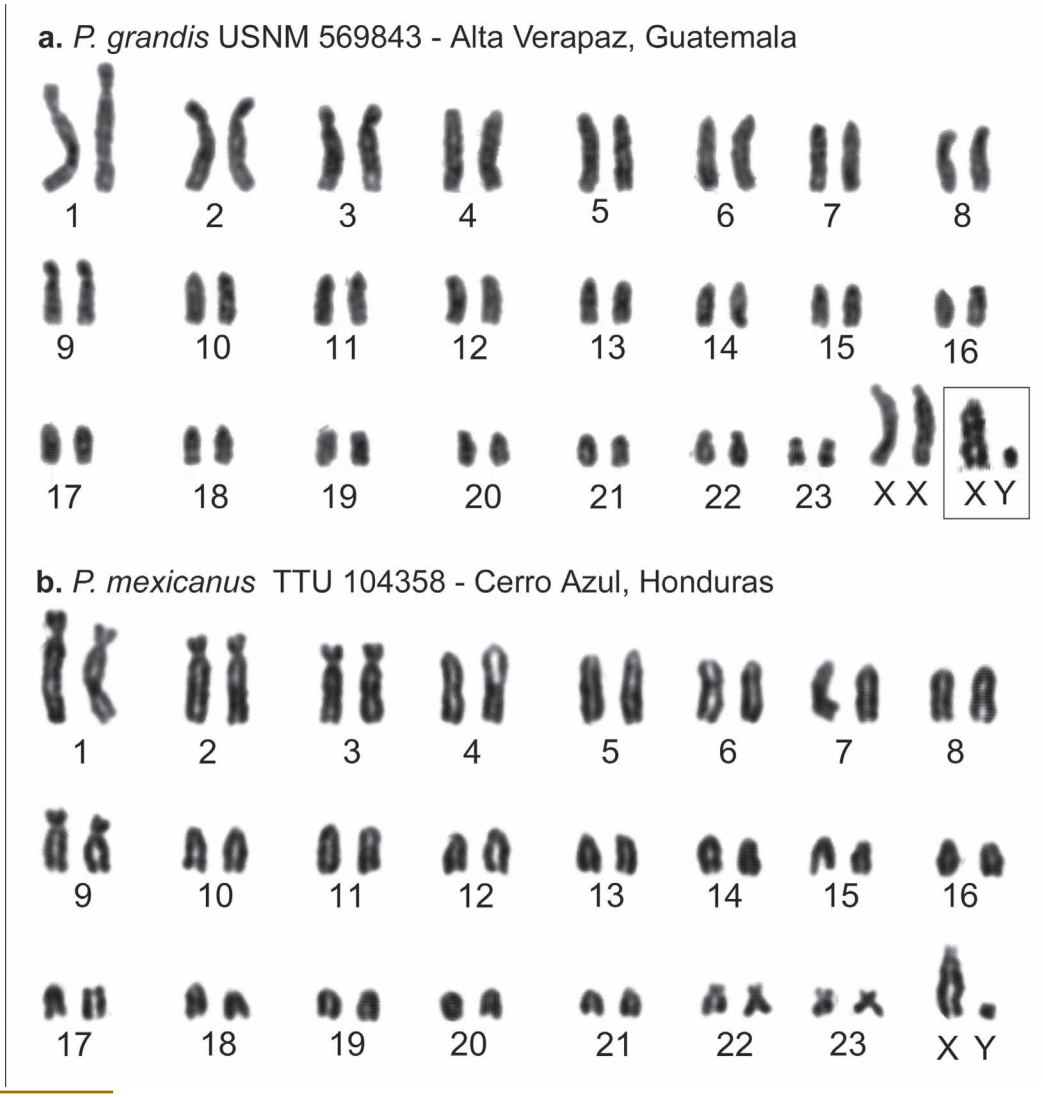

Figure 1. Non-differentially stained karyotypes for *P. grandis* from Guatemala (a) and *P. mexicanus saxatilis* from Honduras (b) depicting chromosomal morphology. The presumptive sex chromosomes in the insert in (a) were obtained from a male *P. grandis* (USNM 569910) and have the same morphology and relative size as the representative of *P. mexicanus saxatilis* (TTU 104358)

The second difference observed in the karyotype of *P. grandis*, relative to its sister taxon, *P. guatemalensis* (Ordóñez-Garza *et al*. 2010) and other members of the *P. mexicanus* species group involves minor differences in the morphology of the X and Y chromosomes. In *P. grandis*, the X chromosome, presumably is large and subtelocentric; whereas the Y chromosome is exceptionally small, acrocentric, and resembles that of *P. guatemalensis, P. mexicanus, P. stirtoni,* and *P. zarhynchus* (Rogers *et al*. 1984; Smith *et al*. 1986; Peppers *et al*. 1999). In general, the karyotype of *P. grandis* agrees with the conclusions of Smith *et al*. (1986) that karyotypic conservatism is consistent throughout the *P. mexicanus* species group as envisioned by Musser and Carleton (2005).

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Appendix I

Specimens examined. For each specimen, the collection locality, and museum catalogue number (abbreviations for museum acronyms follow Hafner *et al*. 1997) are provided in parentheses. Abbreviations are as follows: Museum of Texas Tech University (TTU), and United States National Museum (USNM).

Peromyscus grandis. GUATEMALA: Alta Verapaz; Chelemhá Reserve, Yalijux Mountain (569843, 569910 USNM).

Peromyscus mexicanus. HONDURAS: Atlántida; Lancetilla Botanical Garden (84454 TTU). Colón; Trujillo, Parque Nacional Capiro y Calentura (104186, 104187, 104188, 104189, 104242, 104244, 104246 TTU); La Ceiba; Laboratorio de la Secretaría de Agricultura y Ganadería (103967, 103968 TTU). Comayagua; Parque Nacional Cerro Azul Meámbar (104357, 104358 TTU). Francisco Morazán; Parque Nacional La Tigra (83731, 83732, 83733, 837340 TTU).