Mastozoología Neotropical
ISSN: 0327-9383
ulyses@cenpat.edu.ar
Sociedad Argentina para el Estudio de los Mamíferos
Argentina

Lanzone, Cecilia; Ojeda, Ricardo A.; Albanese, Soledad; Rodríguez, Daniela; Dacar, Mariana
Karyotypic characterization and new geographical record of Salinomys delicatus (Rodentia, Cricetidae, Sigmodontinae)
Mastozoología Neotropical, vol. 12, núm. 2, julio-diciembre, 2005, pp. 257-260
Sociedad Argentina para el Estudio de los Mamíferos
Tucumán, Argentina

Mastozoología Neotropical, 12(2):257-260, Mendoza, 2005
©SAREM, 2005

ISSN 0327-9383
Versión on-line ISSN 1666-0536
www.cricyt.edu.ar/mn.htm

KARYOTYPIC CHARACTERIZATION AND NEW GEOGRAPHICAL RECORD OF *SALINOMYS DELICATUS* (RODENTIA, CRICETIDAE, SIGMODONTINAE)

Cecilia Lanzone, Ricardo A. Ojeda, Soledad Albanese,
Daniela Rodríguez, and Mariana Dacar

Grupo de Investigaciones de la Biodiversidad, IADIZA, CRICYT, CONICET, CC 507, (5500) Mendoza, Argentina.

Key words. Chromosomes. Geographic range. Phyllotini. South American drylands.

The delicate mouse, *Salinomys delicatus*, is a small phyllotine rodent with a narrow distribution in the central aridlands of Argentina. The biology of this monotypic genus is basically unknown, and its record of occurrence is associated to salt flats and sand-dune habitats in the temperate Monte desert and Monte-Chaco ecotonal areas (Braun and Mares, 1995; Ojeda et al., 2001). *Salinomys delicatus* is known from just six localities, and the northernmost record was mentioned for Salinas Grandes and La Antigua salt flats, La Rioja Province (Mares et al., 2000; Ojeda et al., 2001). The delicate mouse shows ecophysiological specializations for a xeric life, such as elongated renal papillae and one of the highest renal indices and urine concentrations among phyllotines and other desert rodents in the world (Diaz and Ojeda, 1999; Diaz, 2001).

The purpose of this note is to report for the first time the karyotype of *S. delicatus*, and a new record of its distribution.

The study area is a desert shrubland located on the Pipanaco's salt basin (27° 49´ 16.15" S,66° 14´ 34.9" W; 740 m), and dominated by *Larrea cuneifolia*, *Atriplex* sp., *Heterostachys ritteriana,* and *Suaeda divaricata.* The "Bolsón de Pipanaco" is located in the Province of Catamarca, Argentina, and belongs to the northern Monte desert (Morello, 1958). The specimen was collected using Sherman traps baited with oatmeal and peanut butter.

A pregnant female (three embryos) of *Salinomys delicatus*, was trapped in early spring 2004 (September). Its standard external measurements (in mm) were: body length: 170; tail length: 97; hind foot length: 23; ear length: 17, and a weight of 12 g. The specimen (skin, skull and karyotype) is housed at the Colección Mastozoológica IADIZA under number CMI 06815. The present record of *S. delicatus* extends the known distribution of this species approximately 270 km to the northwest (**Fig. 1**).

Chromosomes were obtained from bone marrow cells using the conventional in vivo colchicine hypotonic technique (Ford and Hamerton, 1956) with minimal modifications. The diploid number was determined by counting twenty metaphase and prometaphase spreads. Nomenclature for chromosome morphology and fundamental number (FN) followed Patton (1967).

The karyotype of the delicate mouse is composed of 2n = 18 and FN = 32; all chromosome elements are biarmed (**Fig. 2**). Arranging chromosomes by decreasing size, pair one is

Recibido 21 febrero 2005. Aceptación final 4 agosto 2005.

metacentric, pairs two and three are submetacentric, and the remaining chromosomes are metacentric. The first three pairs stand out from the rest because of their large size; the following three pairs are medium-sized, and the last three pairs are small sized. As the individual trapped was a female, sexual chromosomes are indistinguishable from the autosomics pairs. Prometaphase stages, where chromosomes are considerably elongated, were relatively frequent. Identification of secondary constrictions in the smallest chromosome pair was possible only at this stage.

South American drylands constitute biomes of particular importance from the standpoint of their mammalian diversity and endemisms (Mares, 1992; Ojeda et al., 2000). Within these areas, salt flats have been like "islands" that favored diversification and specialization in several groups of rodents (Mares et al., 2000; Ojeda et al., 2001). This seems to be the case of *S. delicatus*, with a high specialization to saline and xeric habitats (Diaz and Ojeda, 1999; Diaz, 2001). Moreover, its narrow geographic range and low records of occupancy (**Fig. 1**; e.g. only seven sites recorded since its description in late 1995) lead us to characterize *Salinomys* as a rare species (Gaston, 1994) among phyllotines.

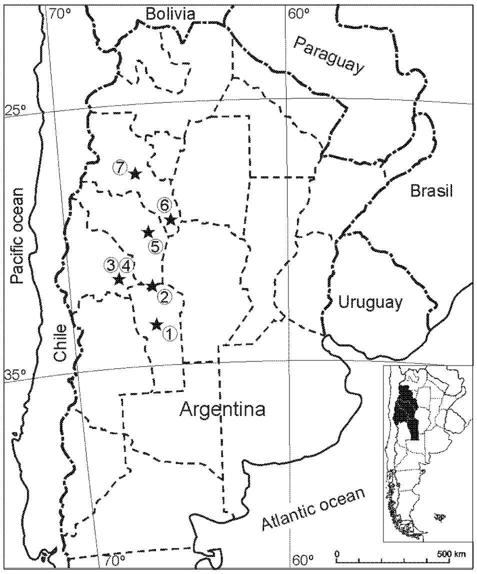

Fig. 1. Localities where *Salinomys delicatus* has been recorded: 1) 15 Km SSE Salina de Bebedero, 411.48 m, Dto. Capital, San Luis; 2) 23 Km N Route 20, Pampa de Las Salinas, near La Botija, 396.24 m, Dto. Ayacucho, San Luis; 3) 15 Km ESE José Martí on road to Chañar Seco, 378.26 m, 31° 54´ 68° 03´ Dto. 25 de Mayo, San Juan; 4) 6 Km N Km 514 of Highway 20 31° 55´ 68° 04´ Dto. 25 de Mayo, San Juan; 5) 45 Km NE of Chamical, Salar La Antigua, 467 m, 30° 02´ 66° 04´, Dto. Chamical, La Rioja; 6) 26 km SW Quimilo, Salinas Grandes, 581 m, 30° 02' 43.4" 65° 31' 13,4", Dto. Chamical, La Rioja; 7) Pipanaco's salt basin, 27° 49´ 16.15" 66° 14´ 34.9", 740 m, Dto. Andalgalá, Catamarca. References of localities: 1-4: Braun and Mares, 1995; 5: Mares et al., 2000; 6: Ojeda et al., 2001; 7: present report.

Karyotypically, the tribe Phyllotini exhibits high chromosomal multiformity (Ortells et al., 1989; Tiranti, 1998; Spotorno et al., 2001; Martino et al., 2002; Lanzone and Ojeda, 2005). Diploid numbers range from 2n = 22 in *Auliscomys boliviensis*, to 2n = 78 in *Andalgalomys p. pearsoni* (Pearson and Patton, 1976; Olds et al., 1987). The karyotype shown in this study comprises the lowest diploid number known among phyllotines. The delicate mouse, *S. delicatus*, is karyotypically similar to *Auliscomys boliviensis* (2n = 22, NF = 30) in its general chromosomal morphology. Both species show a low diploid number and several biarmed chromosomes. Braun and Mares (1995) found *Salinomys* to be morphologically similar to *Graomys*, *Andalgalomys* and *Eligmodontia*. Later molecular analyses have shown a weak relationship among *Salinomys*, *Andalgalomys*, *Eligmodontia* and *Tapecomys* (Anderson and Yates, 2000). However, *S. delicatus* presents a highly divergent karyotype compared with the high diploid numbers reported for *Andalgalomys* species (the lowest diploid number reported for this genus corresponds to *A. olrogi* and *A. roigi* with 2N = 60; Mares and Braun, 1996), and for the monotypic genus *Tapecomys* (*T. primus* 2N = 56; Anderson and Yates, 2000). The karyotypic differences with *Graomys* and *Eligmodontia* are also marked, even when compared with the lowest diploid numbers

Fig. 2. Bone marrow standard Giemsa staining karyotype of *Salinomys delicatus* from Pipanaco's salt basin, Catamarca Province, Argentina.

recorded for these two genera, which correspond to 2n = 28 in *G. domorum* and 2n = 32 in *E. morgani*, respectively (Pearson and Patton, 1976; Kelt et al., 1991; Anderson and Yates, 2000; Spotorno et al., 2001).

In accordance with the proposal by Reig (1986) for the evolution of phyllotines, and assuming that chromosomal fusions are much more frequent than fissions, some authors have suggested a hypothesis of chromosomal evolution for this tribe (Pearson and Patton, 1976; Spotorno et al., 2001). According to this hypothesis, species with ancestral karyotypes (mostly distributed in the high Andean plateau) possess a high diploid number in which telocentric chromosomes predominate. Phylogenetically derived species would be distributed outside of this area, and would present low diploid numbers and mostly meta-submetacentric chromosomes. Along with this reduction in the number of chromosomes, a reduction in the number of NORs (Nuclear Organization Regions) would also have occurred in these species (Spotorno et al., 2001). Under this scenario the karyotype of *S. delicatus* would correspond to a highly derived species among phyllotines. However, later molecular and morphological studies have shown some differences with Reig´s view as to which genera must be included in this tribe (Steppan, 1993, 1995; Smith and Patton, 1999; D´Elia, 2003). Moreover, cytogenetic studies have reported high diploid and fundamental number for phyllotine species in the lowlands, such as in the genera *Andalgalomys* and *Calomys* (Bonvicino et al., 2003 and literature cited there; Olds et al., 1987), thus, contradicting the hypothesis of reduction of chromosome number by Robertsonian fusion in the taxa distributed outside the Andean plateau.

In conclusion, the conjunction of these approaches has shown no simple associations between cladogenetic patterns and cromosomal changes. Like in other rodents, chromosomal evolution may, in some cases, be too complex to resolve unequivocally the evolutionary history of taxa (Baker et al., 1983). Further studies are necessary to test for the degree of consistency between phylogenetic relationships and karyotypic data in order to understand the dynamics of chromosomal change in this chromosomically diverse group of sigmodontine rodents.

We thank two anonymous reviewers and Solana Tabeni for their critical comments and suggestions made on an earlier version of the manuscript. We appreciate the assistance of Silvia Brengio and Agustina Ojeda with laboratory procedures. We thank Nelly Horak for the English version and Daniel Dueñas for drawing the map. This study was partially financed by CONICET (PIP 2884) and SECYT (PICT 11768).

LITERATURE CITED

ANDERSON S and TL YATES. 2000. A new genus and species of Phyllotine rodent from Bolivia. Journal of Mammalogy 81:18-36

BAKER RJ, BF KOOP, and MW HAIDUK. 1983. Resolving systematic relationships with G-bands: a study of five genera of South American cricetine rodents. Systematic Zoology 32:403-416.

BONVICINO CB, JFS LIMA, and FC ALMEIDA. 2003. A new species of *Calomys* Waterhouse (Rodentia, Sigmodontinae) from the Cerrado of Central Brazil. Revista Brasileira de Zoologia 20:301-307.

BRAUN JK and MA MARES. 1995. A new genus and species of Phyllotine rodent (Rodentia:Muridae: Sigmodontinae:Phyllotini) from South America. Journal of Mammalogy 76:504-521.

D´ELÍA G. 2003. Phylogenetics of Sigmodontinae (Rodentia, Muroidea, Cricetidae), with special reference to the akodont group, and with additional comments on historical biogeography. Cladistics 19:307-323.

DIAZ GB and RA OJEDA. 1999. Kidney structure of Argentine desert rodents. Journal of Arid Environments 41:453-461.

DIAZ GB. 2001. Ecofisiología de pequeños mamíferos de las tierras áridas de Argentina: adaptaciones renales. Tesis Doctoral. PROBIOL, Universidad Nacional de Cuyo, Mendoza.

FORD CE and JL HAMERTON. 1956. A colchicine, hypotonic citrate, squash sequence for mammalian chromosomes. Stain Technology 31:247-251.

GASTON KJ. 1994. Rarity. (MB Usher, DL DeAngelis, and RL Kitching, eds.). Population and community biology, series 13. Chapman and Hall. London.

KELT DA, RE PALMA, MH GALLARDO, and JA COOK. 1991. Chromosomal multiformity in *Eligmodontia* (Muridae, Sigmodontinae), and verification of the status of *E. morgani*. Zeitschrift für Säugetierkunde 56:352-358.

LANZONE C and RA OJEDA. 2005. Citotaxonomía y distribución del género *Eligmodontia* (Rodentia, Cricetidae, Sigmodontinae). Mastozoología Neotropical 12:73-77.

MARES MA. 1992. Neotropical mammals and the myth of the Amazonian biodiversity. Science 255:976-979.

MARES MA and JK Braun. 1996. A new species of phyllotine rodent, genus *Andalgalomys* (Muridae: Sigmodontinae), from Argentina. Journal of Mammalogy 77:928-941.

MARES MA, JK BRAUN, RM BARQUEZ, and MM DÍAZ. 2000. Two new genera and species of halophytic desert mammals from isolated salt flats in Argentina. Occasional Papers, Museum of Texas Tech University 203:1-27.

MARTINO AMG, MG FILIPPUCCI, and E CAPANNA. 2002. Evolutive pattern of *Calomys hummelicki* (Husson 1960; Rodentia, Sigmodontinae) inferred from cytogenetic and allozymic data. Mastozoología Neotropical 9:187-197.

MORELLO J. 1958. La Provincia fitogeográfica del Monte. Universidad Nacional de Tucumán e Instituto Miguel Lillo, Opera Lilloana 11:1-155.

OJEDA RA, PG BLENDINGER, and R BRANDL. 2000. Mammals in South American drylands: faunal similarity and trophic structure. Global Ecology and Biogeography 9:115-123

OJEDA RA, MC NAVARRO, CE BORGHI, and AM SCOLLO. 2001. Nuevos registros de *Salinomys* y *Andalgalomys* (Rodentia, Muridae) para la provincia de La Rioja, Argentina. Mastozoología Neotropical 8:69-71.

OLDS N, S ANDERSON, and TL YATES. 1987. Notes on Bolivian mammals 3: A revised diagnosis of *Andalgalomys* (Rodentia, Muridae) and the description of a new subspecies. American Museum of Natural History, New York, American Museum Novitates 2890:1-17.

ORTELLS MO, OA REIG, RL WAINBERG, GE HURTADO DE CATALFO, and TML GENTILE DE FRONZA. 1989. Cytogenetics and karyosystematics of Phyllotine rodens (Cricetidae, Sigmodontinae). II. Chromosome multiformity and autosomal polymorphism in *Eligmodontia*. Zeitschrift für Säugetierkunde 54:129-140.

PATTON JL. 1967. Chromosome studies of certain pocket mice, genus *Perognathus* (Rodentia, Heteromyidae). Journal of Mammalogy 48:27-37.

PEARSON OP and JL PATTON. 1976. Relationship among South American phyllotine rodents based on chromosomal analysis. Journal of Mammalogy 57:339-350.

REIG OA. 1986. Diversity patterns and differentiation of high Andean rodents. Pp 404-438, *in*: High altitude tropical biogeography (F Vuilleumier and M Monasterio, eds.). Oxford University Press.

SMITH MF and JL PATTON. 1999. Phylogenetic relationships and the radiation of sigmodontine rodents in South America: evidence from cytochrome b. Journal of Mammalian Evolution 6:89-128.

SPOTORNO AE, LI WALKER, SV FLORES, M YEVENES, JC MARÍN, and C ZULETA. 2001. Evolución de los filotinos (Rodentia, Muridae) en los Andes del Sur. Revista Chilena de Historia Natural 74:151-166.

STEPPAN SJ. 1993. Phylogenetic relationships among the Phyllotini (Rodentia: Sigmodontinae) using morphological characters. Journal of Mammalian Evolution 3:187-213.

STEPPAN SJ. 1995. Revision of the tribe Phyllotini (Rodentia: Sigmodontinae), with a Phylogenetic hypothesis for the Sigmodontinae. Fieldiana Zoology 80:1-112.

TIRANTI SI. 1998. Cytogenetics of *Graomys griseoflavus* (Rodentia: Sigmodontinae) in central Argentina. Zeitschrift für Säugetierkunde 63:32-36.