

A NEW KARYOTYPE OF *CALOMYS* (RODENTIA, SIGMODONTINAE)

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ABSTRACT

The genus *Calomys* Waterhouse, 1837 is widely distributed within South America, being found in Venezuela, Colombia, Peru, Bolivia, Brazil, Paraguay, Uruguay and Argentina. Specimens of *Calomys* were collected in Formoso do Araguaia, Tocantins, Brazil. For chromosome characterization standard staining techniques and as G-banding and nucleolar organizer region were used. The karyotype was $2n=46$ and $AN=66$. The X chromosome is a medium metacentric and the Y chromosome a small acrocentric chromosome. Chromosome homologies with other species were observed. Probably, karyotype differences were basically due to Robertsonian rearrangements.

KEYWORDS. *Calomys*, karyotype, chromosome, Tocantins, Brazil.

INTRODUCTION

The genus *Calomys* Waterhouse, 1837 is widely distributed within South America, being found in Venezuela, Colombia, Peru, Bolivia, Brazil, Paraguay, Uruguay and Argentina (MUSSEY & CARLETON, 1993). It is more frequently found in open areas, particularly valleys and humid fields and along riverside forests (REIG, 1984; EMMONS & FEER, 1997).

Cytogenetic data on the genus *Calomys* from South America indicate extensive karyotype variation from $2n=36$ to 66 and AN variation from 48 to 76 (PEARSON & PATTON, 1976; ZORRILLA *et al.*, 1990; SVARTMAN & ALMEIDA, 1992), with most of these results based on standard staining procedures. Similar karyotypes were observed for *C. lepidus* Thomas, 1884, specimens from Peru, with $2n=36$ and $AN=68$ (PEARSON & PATTON, 1976) and from Argentina, with $2n=44$ and $AN=68$ (ESPINOSA *et al.*, 1997).

Cytogenetic data on the genus *Calomys* from Brazil show a variation from $2n=36$ to 66 and from $AN=66$ to 68 . Undetermined specimens of *Calomys* collected in São Paulo, presented $2n=66$ and $AN=66$ (YONENAGA, 1975), whereas those collected in the Federal District, identified as *C. laucha tener* Winger, 1888, presented $2n=66$ and $AN=66$ (SVARTMAN & ALMEIDA, 1992). Both karyotypes are highly similar and probably belong to the same species. KASAHARA & YONENAGA -YASSUDA (1984), studying specimens of *Calomys* sp. with $2n=64$, reported that the same $2n$ was observed in specimens of *C. callosus* Rengger, 1830, captured in Rio Grande do Sul. SVARTMAN & ALMEIDA, 1992, studied *C. callosus expulsus* Lund, 1841, from the Federal District with $2n=66$ and $AN=68$. Recently, GEISE *et al.* (1996) found the lowest reported diploid number for the genus *Calomys* in specimens from Minas Gerais, *C. expulsus* with $2n=36$ and $AN=66$.

Few chromosome studies have been conducted on the fauna of the State of Tocantins, especially studies on small mammals. The aim is to describe a new karyotype found in specimens of *Calomys* captured in the State of Tocantins.

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MATERIAL AND METHODS

Twenty *Calomys* specimens (10 males and 10 females) from the Rancho Beira Rio farm (11°47'S, 49°45'W), Formoso do Araguaia, Tocantins, Brazil, were used for chromosome characterization. Direct bone marrow preparations were obtained according to the method of BAKER *et al.* (1982). Slides were submitted to standard staining and to G-banding and staining of the nucleolar organizer regions (NORs) were carried out as described by SEABRIGTH (1971) and HOWELL & BLACK (1980), respectively.

The animals studied were deposited in the collections of the Museu Nacional do Rio de Janeiro (6♀, MNRJ 62735, 62736, 62740-62743; 8♂, MNRJ 62731-62734, 62737-62739, 62744), Universidade Federal do Rio de Janeiro, RJ, and the Instituto de Biologia e Saúde Pública (4♀, IBSP 48, 64, 65, 74; 2♂, IBSP 72, 73) of Fundação Universidade do Tocantins, Porto Nacional, Tocantins.

RESULTS

The analysis of 147 cells revealed a karyotype of $2n=46$ and $AN=66$ for all specimens (fig. 1). The autosome pairs 1 to 11 are metacentrics or submetacentrics, gradually ranging in size from large to small, except for pair 11, which is very small; pairs 12 to 22 are acrocentrics, gradually ranging in size from medium to small, except pair 22 which was very small. The X chromosome is a medium metacentric chromosome, which could not be distinguished from the autosomes of the same morphology and size. The Y chromosome is a small acrocentric and the smallest chromosome of the complement.

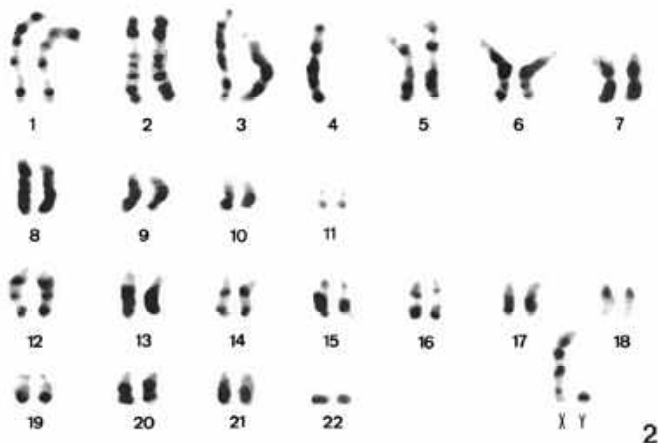
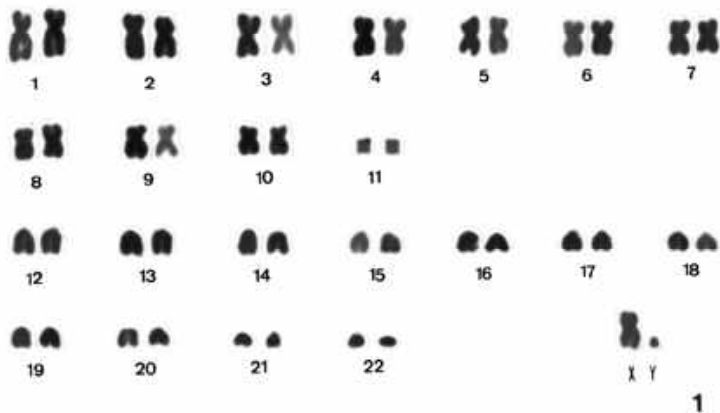
G-banding permitted pairing of all autosomes of the complement, as well as the unequivocal identification of the X chromosome (fig. 2). The Y chromosome showed homogeneous staining.

Twenty metaphase cells from 3 specimens were used for NOR counting. The number of labelings per metaphase ranged from 4 to 11, with 8 being the modal number (fig. 3). Labeling was always observed in the short arms of the medium and small acrocentric chromosomes (fig. 4).

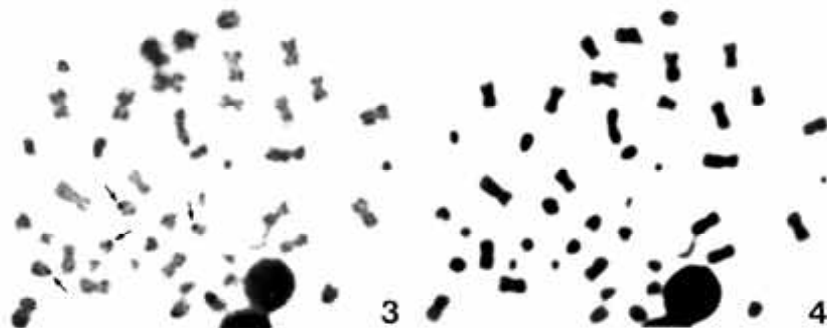
DISCUSSION

Three Brazilian *Calomys* species present the same AN as the *Calomys* sample studied here: *Calomys* sp. (YONENAGA, 1975) and *C. laucha tener* (SVARTMAN & ALMEIDA, 1992), both karyotype with $2n=66$ and $AN=66$, are probably the same species. The third species, *C. expulsus* with $2n=36$ and $AN=66$ (GEISE *et al.*, 1996) is very different from *C. callosus expulsus* with $2n=66$ and $AN=68$ (SVARTMAN & ALMEIDA, 1992), however this karyotype, $2n=36$ and $AN=66$, is very similar to the *C. lepidus* (PEARSON & PATTON, 1976), with $2n=36$ and $AN=68$ from Peru. *Calomys* sp., *C. laucha tener*, *C. expulsus* and the *Calomys* specimens found in Tocantins present the same AN, while the corresponding $2n$ is quite different. Therefore, it may be supposed that the differences in these karyotypes are basically due to Robertsonian rearrangements. In this respect, 10 rearrangements may have occurred between *Calomys* from Tocantins with $2n=46$ and $AN=66$ and *C. laucha tener* with $2n=66$ and $AN=66$, while in the case of *C. expulsus* with $2n=36$ and $AN=66$, the difference would be attributable to plus 5 rearrangements.

Calomys specimens from Tocantins also show a high karyotype similarity with *C. lepidus*, which presents two karyotype variants: one variant from Peru with $2n=36$ and $AN=68$, with all autosomes consisting of two-arms (PEARSON & PATTON, 1976), and the other from Argentina with $2n=44$ and $AN=68$, with the autosome complement consisting of 13 two-arm and 8 telocentrics pairs (ESPINOSA *et al.*, 1997). The differences observed



Figs. 1, 2. Karyotypes of *Calomys* specimens from Tocantins ($2n=46$ and $AN=66$): 1, male, conventional staining; 2, male, G-band patterns.



Figs. 3, 4. Metaphase of *Calomys*, male with $2n=46$: 3, four NOR-bearing chromosomes (arrows); 4, the same metaphase plate, conventional staining.

in AN may be explained by a mechanism of the fusion or fission type.

To answer these questions, G-banding patterns were compared between *Calomys* from Tocantins and the *C. callosus expulsus* with $2n=66$ and $AN=68$ (SVARTMAN & ALMEIDA, 1992), which present G-banding results. Although the quality of the bands and the different degree of chromatin condensation were different, homology was observed, mainly, among the first pairs these species formerly cited. The following homologies were observed, respectively, between *Calomys* from Tocantins and *C. callosus expulsus*: large arms of pair 1 with pair 1, short arms of pair 1 with pair 2, large arms of pair 2 with pair 3, and acrocentrics pairs 12 with 15 and 13 with 17. We believe that the use of more adequate banding patterns with equivalent chromatin condensation levels will permit the determination of the sequence of events that occurred.

In *Calomys* from Tocantins, NOR labeling was restricted to the telomeric regions of the short arms of the medium and small acrocentric chromosomes. The number of NORs ranged from 4 to 11 and the modal number 8 was similar to that observed in *C. callosus expulsus* and *C. tener* (SVARTMAN & ALMEIDA, 1992).

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