

Karyotypes of Brazilian squirrels: *Sciurus spadiceus* and *Sciurus alphonsei* (Rodentia, Sciuridae)

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A b s t r a c t. The karyotypes of *Sciurus alphonsei* from the Brazilian Atlantic Forest and *S. spadiceus* from the Amazon region are described. Standard staining revealed $2n = 40$ and $FN = 76$ in both species, with all autosome pairs being biarmed. C-banding in *S. alphonsei* showed pericentromeric labelling only. The karyotypes obtained are similar to those known for Holarctic taxa, except *S. vulgaris* and *S. v. coreae* that have $FN = 72$. The karyotypic stability of the diploid number in genus *Sciurus* is confirmed.

Key words: karyotypes, *Sciurus spadiceus*, *Sciurus alphonsei*, Amazon, Atlantic Forest, Brazil

Introduction

Family Sciuridae includes 273 species belonging to 50 genera. 28 species have been recognised in genus *Sciurus*, of which 11 inhabit South America and four occur in Brazil (Hoffmann et al. 1993). Sciurid species have been frequently studied from a cytogenetic point of view. Despite this, none of the karyotypes of South American species have been described, and most of the information available is on North and Central American taxa (Petit et al. 1984, Nadler & Sutton 1967). In the present study, the karyotypes of *Sciurus alphonsei* and *S. spadiceus*, two squirrel species occurring in the Brazil's Atlantic Forest and Amazon Region, respectively, are described.

Material and Methods

We studied a female specimen of *S. alphonsei* that was captured in the Buraquinho Forest (06°07'S, 34°45'W), a large patch of Atlantic Forest in João Pessoa, Paraíba State, Brazil. The male specimen of *S. spadiceus*, supplied by the ELETRONORTE Electric Company, was captured before the flooding of the reservoir of the Samuel Hydroelectric Dam (08°45'S; 63°26'W), River Jamari, Rondônia State, Brazil.

Mitotic preparations were obtained directly from bone marrow following a technique modified slightly from that of Baker et al. (1982). Slides were stained with 5% Giemsa solution. C-banding was performed according to the method of Sumner (1972). Chromosome pairs were arranged in decreasing order of size, and their nomenclature followed Levan et al. (1964). Twenty metaphases were analysed for *S. alphonsei* and 10 for *S. spadiceus*. Voucher specimens were deposited in the mammal collection of the Department of Systematics and Ecology of the Federal University of Paraíba (UFPB) at João Pessoa.

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Results and Discussion

Both *Sciurus* species presented $2n = 40$ and $FN = 76$ (Figs 1 and 2). All autosomes are biarmed; pairs 1 to 13 are submetacentric and pairs 14 to 19 are metacentric. Pair 1 showed a constriction not stained with Giemsa in the distal region of the long arm in both species; this constriction is most probably related to the Nucleolar Organiser Region. N a d l e r & S u t t o n (1967) state that the occurrence of secondary constrictions is rare in sciurids, but

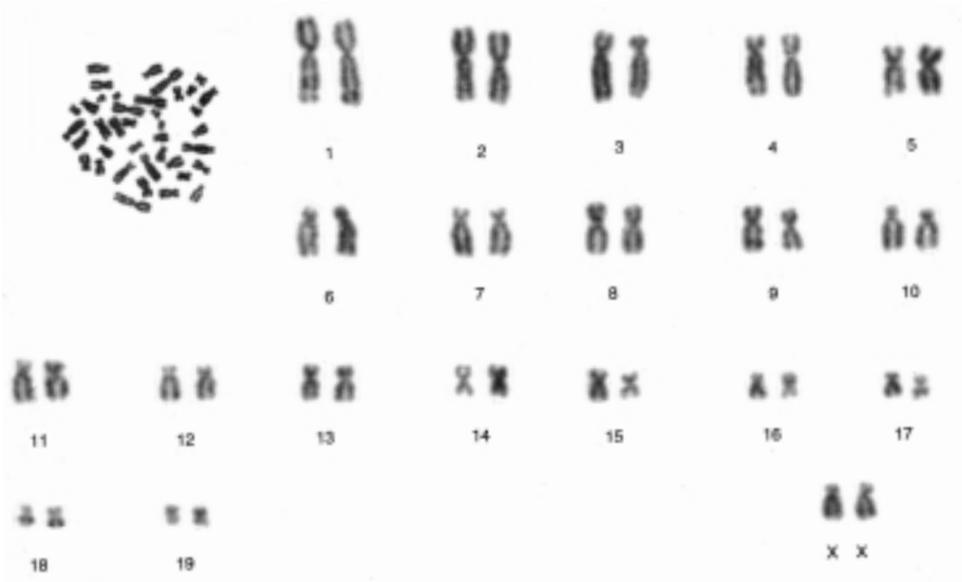


Fig. 1. Karyotype of female *S. alphonsei* ($2n = 40$ and $FN = 76$), standard staining (UFPB Nr. 2980).

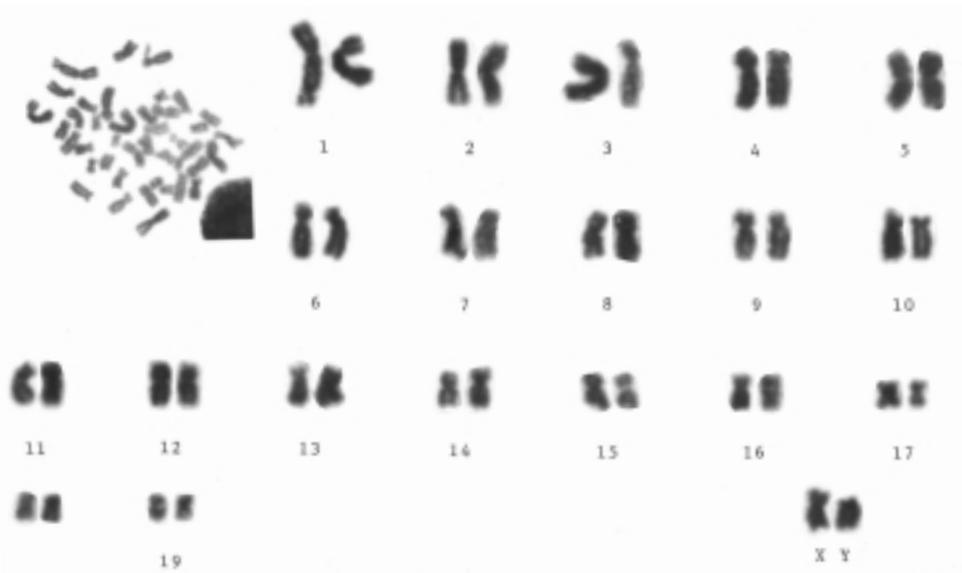


Fig. 2. Karyotype of male *S. spadicus* ($2n = 40$ and $FN = 76$), standard staining (UFPB Nr. 1235).

they describe it in the first and second chromosome pairs of *S. griseus*. We detected no constriction in the second chromosome pair.

The X chromosome in *S. spadiceus* is submetacentric, its size is similar to the 13th pair, and the Y chromosome is a medium-sized acrocentric that is smaller than the X. The pair of sex chromosomes in the *S. alphonsei* female was tentatively identified as submetacentric of medium size. The X chromosome of most *Sciurus* species is a submetacentric, equivalent in size range to the chromosomes of pair 13 (Figs 1 and 2). We therefore believe that *S. alphonsei* may have similar X chromosomes.

In *S. alphonsei* C-banding showed slight positive staining in the pericentromeric region of all chromosomes, except pairs 8, 10, and 19. Pairs 3, 4 and 5 showed irregular, dark areas that were recognised as artefacts (Fig. 3). These centromeric C-bands were also found in *S. vulgaris coreae* (Kim & Lee 1990) but our specimens do not show C-bands in the telomeres of the short arms, as are present in some chromosomes in *S. vulgaris* (Petit et al. 1984) and *S. vulgaris coreae* (Kim & Lee 1990).

The sciurids studied cytogenetically thus far are characterised by a stable diploid number of $2n = 40$, and little variation in fundamental number, $FN = 72$ or 76 . The X chromosome is always metacentric or submetacentric. In *Sciurus*, the karyotypes of 10 species and subspecies are known (names are those used in the original publications): *S. carolinensis*, *S. c. carolinensis*, *S. c. pensilvanicus*, *S. niger*, *S. n. rufiventer*, *S. aberti* and *S. griseus* (Nadler & Sutton 1967), *S. vulgaris* (Renzoni 1967, Petit et al. 1984, Zima 1987), *S. vulgaris coreae* (Kim & Lee 1990), *S. vulgaris orientis* (Sasaki et al. 1969) and *S. vulgaris exalbidus* (Lapunova & Zolnerovskaja 1969). The first seven karyotypes cited above show $2n = 40$ and $FN = 76$, with 19 pairs of biarmed autosomes. The X is a medium-sized submetacentric, and the Y is a medium-sized acrocentric. *Sciurus vulgaris* is the only squirrel of this genus that has $2n = 40$ and $FN = 72$, including 17 biarmed chromosome pairs and two one-armed chromosome pairs (Renzoni 1967). Zima (1987) reviewed the literature on *S. vulgaris* karyotypes and found that animals from various regions showed differences in the number of uniarmed chromosomes: *S. vulgaris orientis* has two pairs of uniarmed chromosomes and *S. vulgaris exalbidus* (from

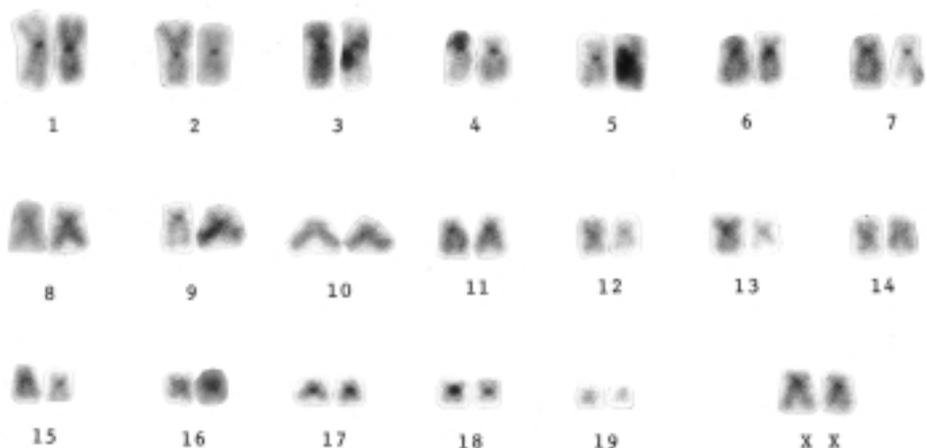


Fig. 3. Karyotype of female *S. alphonsei* ($2n = 40$ and $NF = 76$), C-banding.

Novosibirsk) showed tree uniarmed pairs. This difference in karyotype may be explained by pericentric inversion. The X chromosome of *S. vulgaris* is a medium sized submetacentric or metacentric, and the Y is a subtelocentric or acrocentric, and smaller than the X.

Our data refer to a different continent and a locality very distant geographically from that of the nearest known sciurid karyotype. Although both geographic and interspecific variation in karyotype could be expected, the stability of the genus' diploid number is confirmed.

A c k n o w l e d g m e n t s

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