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CHROMOSOMAL VARIATION IN *ALOUATTA FUSCA*

The genus *Alouatta* (Primates, Atelidae) includes six different species, with a wide distribution in South and Central America (James *et al.*, 1993). Of these, the brown howling monkey (*Alouatta fusca*) is endemic to the Atlantic Coastal Forest being found from Bahia, Espírito Santo and Minas Gerais (Brazil) south to Misiones (Argentina), and comprises two subspecies: *A. fusca fusca* and *A. fusca clamitans*.

Koiffmann (1977) reported a variation in the diploid number of *A. fusca* from 48 to 50. The diploid number of 48 chromosomes was found in a single male from Registro (southern part of the state of São Paulo), heterozygotic for two Robertsonian rearrangements. The same author reported males with $2n = 49$, due to a y-autosome translocation, and males and females with $2n = 50$.

Methods

Blood samples of ten specimens of *Alouatta fusca*, eight males and two females from different localities (Table 1), were collected using heparinized plastic syringes. Lymphocytes were cultivated for 72 hours in RPMI medium, enriched with fetal calf serum at 20% and Phytohemagglutinin at 2%. The chromosome analyses were performed by G-C-NOR banding procedures (Seabright, 1971; Sumner, 1972; Howel and Black, 1980).

Results and Discussion

The chromosome complement of *Alouatta fusca* showed a wide variation in the diploid number, with $2n = 45, 46, 49$ and 52 . This variation may be associated with the geographic origin of each individual (Table 1).

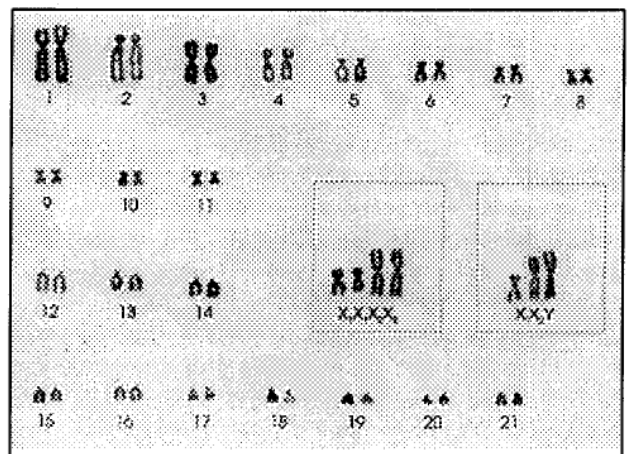


Figure 1. Karyotype of *Alouatta fusca* from southern Brazil.

Table 1 Procecence and diploid number of the specimens of *A. fusca* analyzed in this study.

Sex	Procecence	Diploid Number
Male	Espírito Santo	52
Male	Rio de Janeiro	49
Male	Rio de Janeiro	49
Male	Rio de Janeiro	49
Male	Rio de Janeiro	49
Female	Santa Catarina	46
Female	Santa Catarina	46
Male	Paraná	45
Male	Paraná	45
Male	Paraná	45

The karyotype of the specimens from southern Brazil comprised 45 chromosomes in the males, and 46 in the females (Fig. 1). The analysis of the G-banded chromosomes of the males, compared to those of the females, allowed us to assume that this variation was due to a y-autosome translocation involving a large submetacentric pair. This rearrangement was also observed in the four males from the state of Rio de Janeiro, which showed $2n = 49$ (Fig. 2), with a heteromorphic submetacentric pair, not found in previously reported karyotypes of females (Koiffmann, 1977). The only male from the state of Espírito Santo had 52 chromosomes, with a small

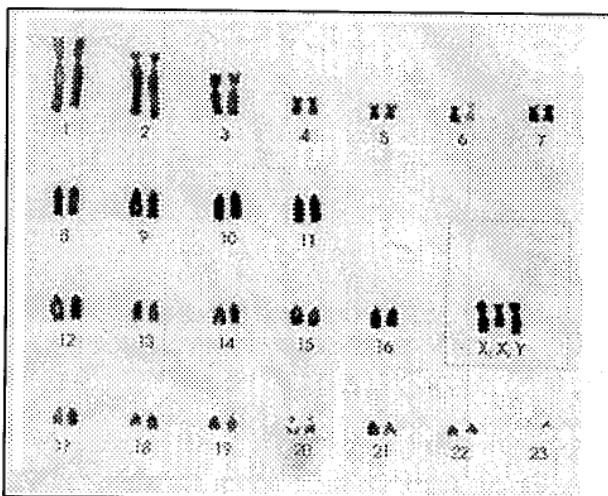


Figure 2. Karyotype of *Alouatta fusca*, male, from Rio de Janeiro.

acrocentric y-chromosome (Fig. 3).

G-banded karyotypes of $2n = 45$ and 46 and $2n = 49$ were compared. Unfortunately, we did not succeed in banding the karyotype with $2n = 52$. Based on this comparison, we could clearly identify two Robertsonian rearrangements (fusion/fission), as well as pericentric inversions. Moreover, some chromosomes found in the southern karyotype could not easily be recognized in $2n = 49$, suggesting that complex rearrangements, such as multiple translocations, were also involved in the differentiation of these two cytotypes. We assume

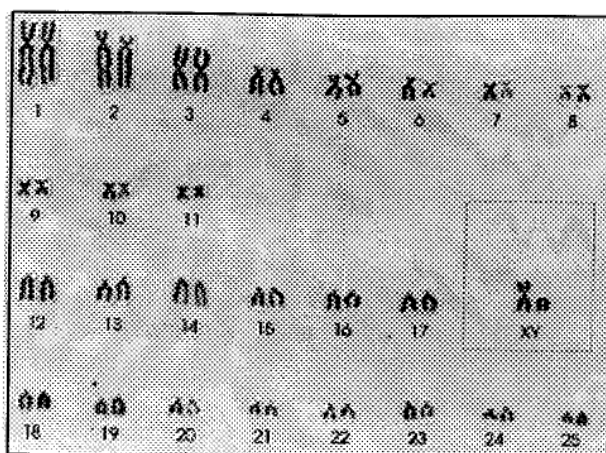


Figure 3. Karyotype of *Alouatta fusca*, male, from Espírito Santo.

that Robertsonian rearrangements and pericentric inversions have played a critical role in the chromosomal evolution of this species.

Although the chromosomal variation in *A. fusca* seems to be clinal, and agrees with the clinal variation found in the hair color patterns, (R. Gregorin, pers. comm.), the results of the chromosome comparisons suggest that the populations analyzed are in different stages of speciation, and probably reproductively isolated, due to meiotic disturbances. A complete failure to hybridize, or the production of hybrids presenting reduced fertility or complete sterility would indicate that the parents belong to different species. Although meiotic and crossbreeding studies should be carried out to confirm our hypothesis, we suggest that the different cytotypes found in *Alouatta fusca* are reproductively isolated, with hybrids presenting very low fertility, if not complete sterility. We suggest that the taxonomy of *Alouatta fusca* should be critically reviewed, based not only on morphology, but also cytogenetics, biochemistry and other approaches that could clarify the phylogeny and taxonomy of this species.

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News

TWO BREEDING FEMALES IN A *SAGUINUS FUSCICOLLIS* WEDDELLI GROUP

On 20 September 1994, we captured a group of saddleback tamarins composed of six individuals (one adult male, two adult females, one subadult male, one subadult female, and one juvenile male) in a "*Saguinus* trap" (Encarnación *et al.*, 1990) in the Zoobotanical Park of the Federal University of Acre (956°30' - 957°19'S, 6752°08' - 6753°00'W; 155 m above sea level; area 100 ha). All individuals except one adult female, suspected to be pregnant, were anesthetized, weighed, measured and fitted with collars of different colors.

On 24 October, the adult male (Blue) was seen carrying two newborn infants of the unmarked adult female. One week later, while Blue was carrying the infants (the only individual except the mother seen to do so), the other adult female (Orange) was

seen surrendering food (banana) to him. By 13 December the infants were feeding at the capture platform, and were quite independent.

About two months later, Orange gave birth to twins, first seen on 23 January, increasing the group size to 10. These new infants were carried by Orange, Blue and a subadult female (Yellow). It seemed that Blue was the father, being the only adult male. The infants were last seen in April 1995, apparently healthy.

This would seem to be a case of polygyny, an uncommon mating system in callitrichids (for reviews see Rylands, 1993), having been observed in only four species to date (*Callithrix jacchus* - Digby and Ferrari, 1994; *Callithrix kuhli* - Alonso and Porfirio, 1993; *Saguinus fuscicollis* - Terborgh and Goldizen, 1985; and *Leontopithecus rosalia* - Dietz and Baker, 1993).

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