

SHORT COMMUNICATION

# Chromosome study in two *Aratinga* species (*A. guarouba* and *A. acuticaudata*) (Psittaciformes)

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## ABSTRACT

The karyotypes of two species of Psittacidae of the genus *Aratinga*, *Aratinga guarouba* and *A. acuticaudata* were studied for the first time. The metaphases were obtained using a short term culture of feather pulp. These karyotypes are compared with others of the genus and their karyological relationships in the Psittaciformes are discussed.

## INTRODUCTION

Cytogenetic studies of birds are relatively rare as compared with similar studies in other vertebrate classes. The most complete revision on this matter was made by De Lucca and Rocha (1992). There are approximately 9021 species of birds, 1590 of them living in Brazil. According to the authors, 165 species were cytogenetically analyzed. In 1995, Duarte and Caparroz analyzed eight more species totalling 173 species of birds for which karyotypes are known.

The order Psittaciformes presently has 41 species analyzed belonging to 15 different genera (Manfredi and Ferrari, 1979; De Lucca, 1980, 1985; De Lucca and Marco, 1983; Aquino, 1987; De Lucca *et al.*, 1991; Duarte and Caparroz, 1995).

The genus *Aratinga* includes species with habitat from South América to Mexico. Forshaw (1977) described 19 species in this genus, 10 of which are found in Brazilian territory.

De Lucca (1984) studied the karyotype of 5 species of *Aratinga* (*A. aurea*, *A. auricapilla*, *A. cactorum*, *A. leucophtalmus*, *A. solstitialis*) using bone marrow cells.

De Lucca *et al.* (1991) studied the species *A. jandaya*, mentioning a great similarity between its karyotype and that of *A. aurea*.

We analyzed the karyotypes of *A. acuticaudata* and *A. guarouba*, the latter one threatened by extinction, using a short term culture of feather pulp aiming at a better knowledge of genus *Aratinga* and its evolutionary processes.

## MATERIAL AND METHODS

Young feathers of two males and two females of *Aratinga acuticaudata* and three males and three females of *Aratinga guarouba*, belonging to the Rio-Zoo Foundation in Rio de Janeiro State, were collected.

From each species, forty metaphases were analyzed by conventional staining method.

The cytogenetic preparations were made following the direct method with young feather pulp, described by Giannoni *et al.* (1986) with slight modifications. The technique consisted of removing three to four primary feathers and approximately 15 days later, taking out the young bulbs and transporting them to the laboratory on ice.

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The material extracted from the young bulbs was cultured for 40 min in 10 ml McCoy's medium with five drops of a 0,0016% colchicine solution at 37°C. After centrifugation at 1000 rpm for 10 min, the material was hypotonized at 37°C for 30 min with a 0.075 M KCl solution and fixed in a 3:1 methanol/acetic acid solution following the usual standard for chromosome analysis.

## RESULTS

Sex determination was easily obtained since Z and W chromosomes in Psittaciformes are clearly visualized. It was possible to obtain a sufficient number of metaphases in order to establish the karyotypic pattern of the two species.

Both species presented  $2n = 70$  chromosomes like other *Aratinga* species (De Lucca, 1984 and De Lucca *et al.*, 1991), and a very sharp boundary was observed between the microchromosomes and the ten pairs of macrochromosomes.

Figure 1 shows metaphase and karyotype of a female *Aratinga acuticaudata*. The first pair consisted of large metacentrics, and the second pair of subtelocentrics almost of the same shape of the first pair. The third pair was submetacentric and the 4th, 5th and 6th were subtelocentrics having a remarkable reduction of size from the 4th to the 5th pair. The 7th pair was submetacentric, and the 8th and 9th were formed by little metacentric chromosomes. The Z chromosome was metacentric corresponding to the 5th pair in shape and the W was a small submetacentric corresponding to the 8th in shape. Figure 2 shows a male metaphase of *A. acuticaudata* and the arrows indicate the Z chromosomes.

Figure 3 shows metaphase and karyotype of a female *Aratinga guarouba*. This species showed similar karyotypic characteristics to *A. acuticaudata* except the 2nd and 4th pairs which were submetacentrics, the 7th pair which was metacentric, and the 8th and 9th which were submetacentrics in this species. Figure 4 shows the metaphase of a male *A. guarouba* and the arrows indicate the Z chromosomes.

## DISCUSSION

The species *A. guarouba* and *A. acuticaudata* had the first pair of chromosomes classified as metacentric. This is a distinctive characteristic of Psittaciformes, occurring also in genus *Ara*, *Loriculus*, *Psittacula*, *Nestor*, *Psitttriches*, *Electrus*, *Forpus*, *Poicephalus*, and *Polytelis* of family Psittacidae and in genus *Lorius* of family Loriidae.

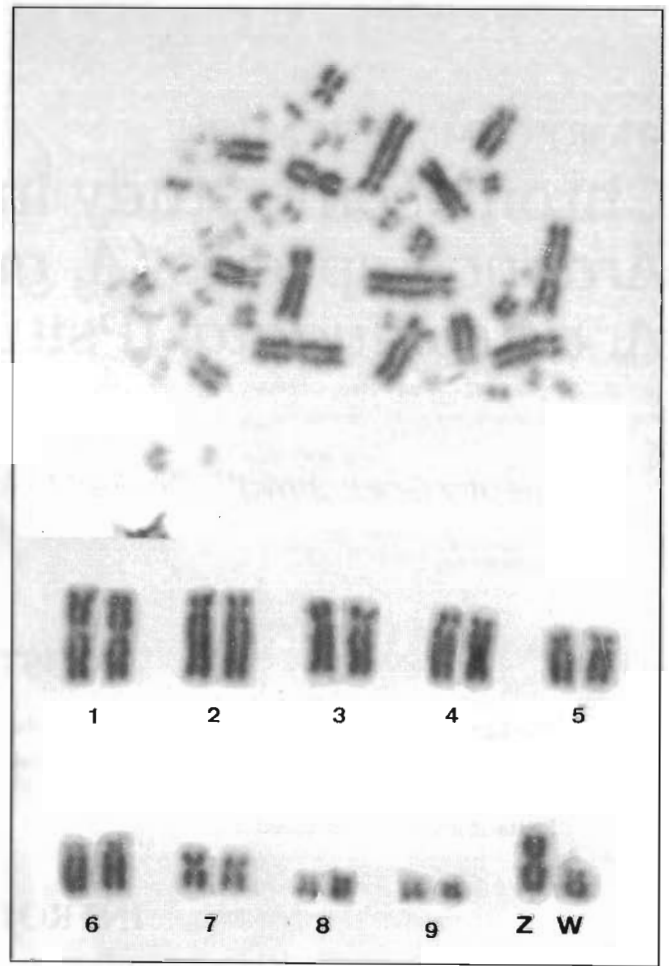


Figure 1 - Metaphase and karyotype of a female *Aratinga acuticaudata*.

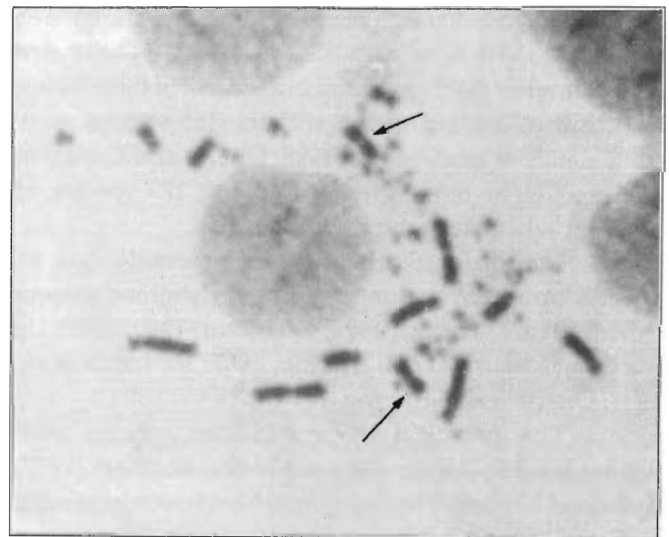


Figure 2 - Metaphase of a male *Aratinga acuticaudata*. The arrows indicate the sexual pair.

The karyotype of both *Aratinga* species showed to be rather similar, with differences in the 2th and 4th pairs which were subtelocentrics in *A. acuticaudata* and submetacentrics in *A. guarouba*, and in the 7th pair which was submetacentric in *A. guarouba* and meta-

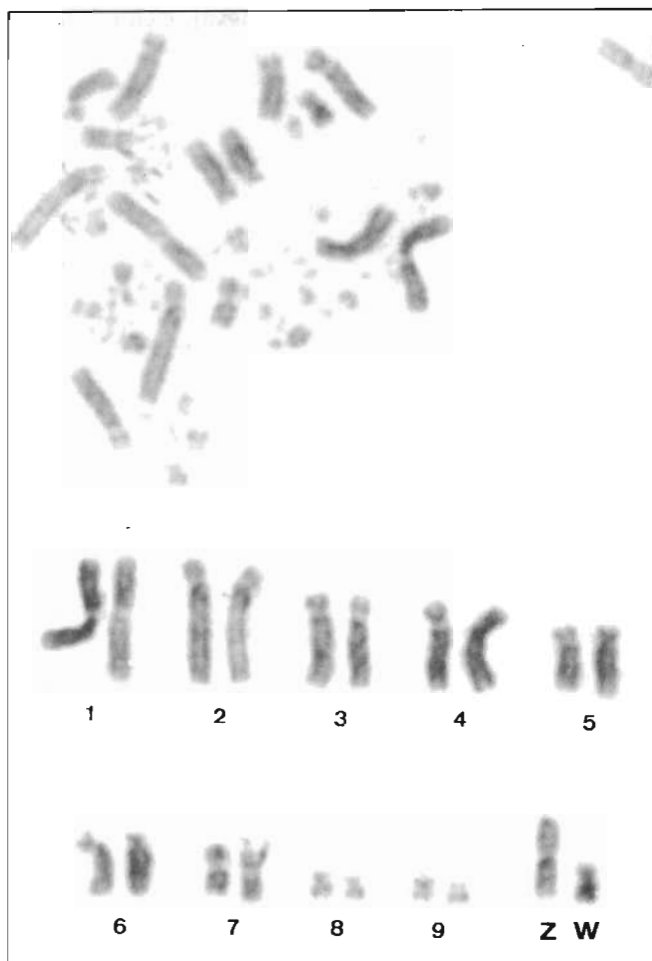


Figure 3 - Metaphase and karyotype of a female *Aratinga guarouba*.

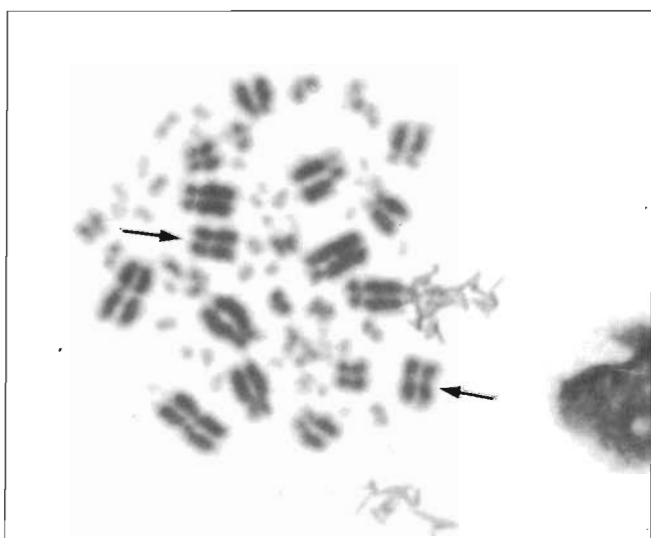


Figure 4 - Metaphase of a male *Aratinga guarouba*. The arrows indicate the sexual pair.

centric in *A. acuticaudata*. The 8th and 9th pairs were metacentrics in *A. acuticaudata* and submetacentrics in *A. guarouba*.

The karyotypic results found in *A. acuticaudata* showed to be very similar to those described by De

Lucca (1984) for species *A. cactorum*, with differences in pair 8, which was metacentric in the first and submetacentric in the second, and in W chromosome, submetacentric in *A. acuticaudata* and metacentric in *A. cactorum*.

According to Sick (1990), *A. guarouba* differs from other *Aratinga* species in regard to behavior, vocalization and reproduction. Therefore, the author suggested it to represent a monotypic genus *Guarouba* and to be named *Guarouba guarouba*.

However, the species *A. guarouba* showed similar cytogenetic results to those obtained in other *Aratinga* species. The 5th pair in *A. guarouba* was subtelocentric, similar to *A. solstitialis* and *A. acuticaudata*, differing from the other species analyzed where it is submetacentric. Among the species already studied of this genus, the one that presented greatest karyotypic similarity with *A. guarouba* was *A. jandaya* (De Lucca *et al.*, 1991), including the 7th pair, which is metacentric in both. As no female karyotype of *A. jandaya* has been published, the W chromosome of this species remains unknown.

Within the genus *Aratinga*, it is possible to observe several differences in centromeric position between the same chromosome pair of each species but the shape of these chromosomes remains always the same. So, we hypothesize that pericentric inversions are responsible for these variations.

## ACKNOWLEDGMENTS

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## RESUMO

Foram estudados pela primeira vez os cariótipos de duas espécies do gênero *Aratinga*, *A. guarouba* e *A. acuticaudata*. As metáfases foram obtidas utilizando-se o método de cultura de curta duração de polpa de penas jovens. Estes cariótipos foram comparados com outros do mesmo gênero. Interpretações cariológicas na ordem Psittaciformes são discutidas.

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