CYTOGENETIC STUDY IN THREE SPECIES OF TOUCANS (*RAMPHASTOS TOCO, RAMPHASTOS VITELLINUS AND RAMPHASTOS DICOLORUS*)

ESTUDIO CITOGENÉTICO EN TRES ESPECIES DE TUCÁN *(RAMPHASTOS TOCO, RAMPHASTOS VITELLINUS Y RAMPHASTOS DICOLORUS)*

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Additional keywords

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Palabras clave adicionales

Cromosomas. Aves.

SUMMARY

The karyotypes of two species of toucans cytogenetically unknown are described. For reasons of comparison, the karyotype of *R. toco* is also described. The three species present great karyotypic similarity and evolutive interpretation are commented.

RESUMEN

Se describen los cariotipos de dos especies de tucanes citogenéticamente desconocidas. Por razones de comparación también se describe el cariotipo de *R. toco*. Las tres especies presentan gran semejanza cariotípica y se comenta la interpretación evolutiva.

INTRODUCTION

In Brazil, four species of toucans of genus *Ramphastos* are know. They are birds belonging to the order Piciformes and are: *R. toco, R.vitellinus* and *R. tucanus*.

In eastern Brazil there only occur *R.vitellin*us and *R.dicolorus*, but in the center of the country begin to appear *R. toco* and in Brazilian Amazonia *R. vitellinus* and *R. tucanus* are predominant (Sick, 1985).

This birds do not present visible sexual dimorphism.

Chromosome studies of this group only counts with the contribution of Takagi and Sasaki 1980, 1981) where the authors described the karyological similarity between *R. toco* and *Chunga burmeister* (siriema). Further Nogueira and Goldschmidt (1995) described the karyotype of *R. toco* with a large metacentric pair and the submetacentric sexual Z chromosome of the size equivalent to the first autosomic pair. The restant chromosomes and the sexual

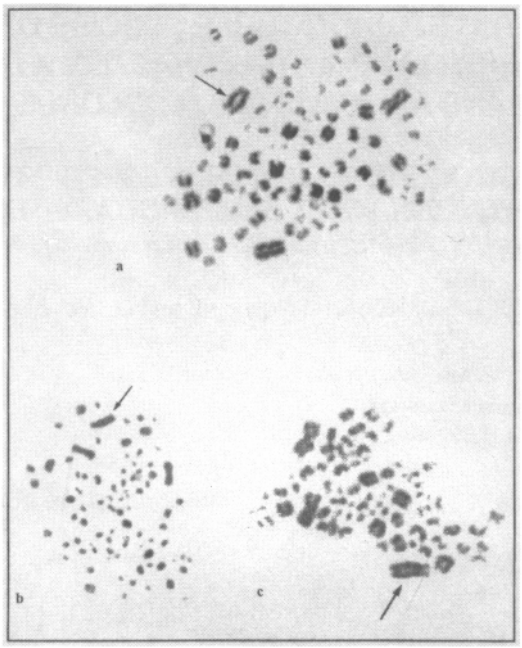

Figure 1. *a) Metaphase of* R. toco *b) Metaphase of* R. dicolorus . *c) Metaphase of* R. vitellinus. *The arrows indicate only one Z chromosome which is characteristic of the female complement. W chromosome is not visible.* (a) Metafase de *R. toco.* b) Metafase de *R. dicolorus.* c) Metafase de *R. vitellinus.* El cromosoma W no es visible).

W chromosome would be represented by microchromosomes.

MATERIAL AND METHODS

The chromosome study was carried out in five males and seven females of specie *R. toco* two males and two females of specie *dicolorus* and two males and two females of species *R. vitellinus*, all belonging to the Rio-Zoo Foundation and conservacionistic breeders.

Metaphases were obtained utilizing the young pulp feathers culture (De Lucca and Rocha, 1992). Three to four primary feathers were retired and approximately fifteen days afterwards the bulbs were collected and transported on ice to the laboratory. The dermic pulp was extracted and after maceration, the cells were incubated in l0 ml McCoy's medium with five drops of 0.0016 p. cent solution of colchicin at 37°C for 40 minutes. Hypotonization was obtained with a solution 0.075M of KCl at 37°C for 30 minutes and than three times rinsed in the fixative solution (3:1 methanol:acetic acid) to drop on slides previously washed.

Conventional staining was used with a 3 p. cent Giemsa solution in phosphate buffer pH 6.8 for five minutes.

RESULTS

Karyotypes of the three species studied presented similarities by conventional staining of the chromosomes.

The diploid number found remain around 94 chromosomes. Only the first two pairs are macrochromosomes whilst the rest was of rather inferior size and might be considered microchromosomes.

The larger pair of the complement is acrocentric and corresponds to the sexual pair ZZ. In the females, the chromosome W confounds with microchromosomes and can not be identified with conventional staining method **(figure 1)**. Sexing is executed by the number of Z chromosomes observed.

In the three species the second larger pair of the complement is metacentric and corresponds to the first autosomic pair. The restant chromosomes are acrocentric and are decreasing in size down to the tiny microchromosomes. In the species *R. dicolorus* **(figure 2)** is present a small metacentric pair wich is not observed in *R. toco* **(figure 3)** and *R.vitellinus* **(figure 4)**.

DISCUSSION

The typical karyotype of birds consist of various pairs of large and medium size chromosomes wich are considered macrochromosomes and a number of microchromosomes wich are responsible for the difficulty in estabilishing the exact chromosome number, as is the case with genus *Ramphastos*.

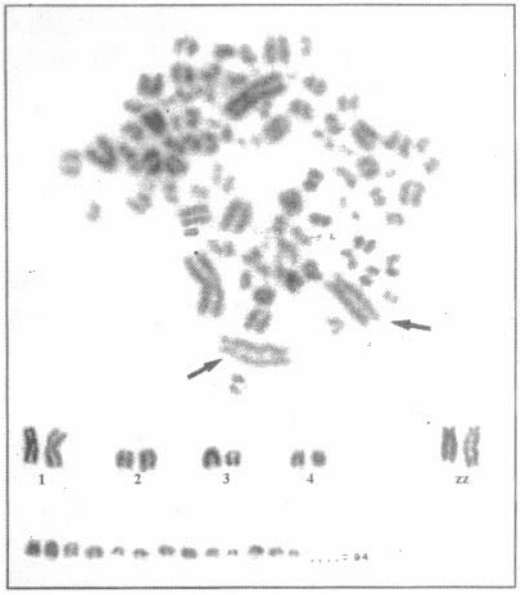

Figure 2. *Metaphase and partial karyotype of a male* Ramphastos dicolorus. *Arrows indicate the sexual chromosomes.* (Metafase y cariotipo parcial de un macho de *Ramphastos dicolorus*. Las flechas indican los cromosomas sexuales).

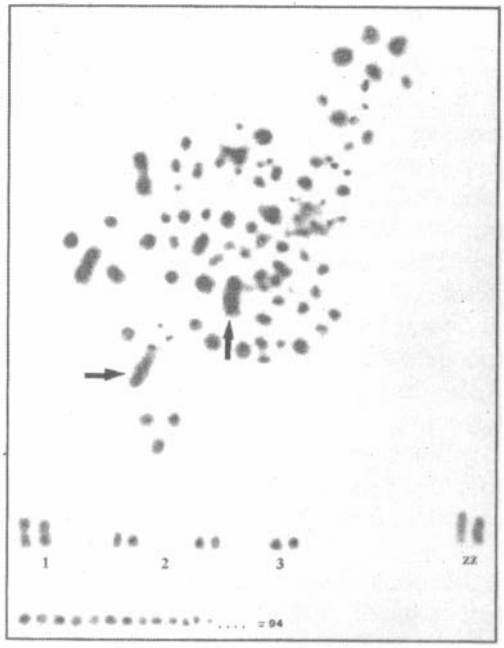

Figure 3. *Metaphase and parcial karyotype of a male* Ramphastos toco. *Arrows indicate the sexual chromosomes.* (Metafase y cariotipo parcial de un macho de *Ramphastos toco.* Las flechas indican los cromosomas sexuales).

In the greater part of bird species, the Z chromosome is an element of size comparable to the fourt and fith autosomic pair whilst the W chromosome is one of the microchromosomes.

In the same way, demonstrated in *R. toco*, *R. vitellus* and *R. dicolor*, in the species *B. versicolorus chiriri* (Aquino, 1987), *Calyptohyncus magnificus* (Van Dongen and De Boer, 1984) and *A. xanthops* (Barbanti and Duarte 1995) of the order Psittaciformes, the Z chromosome presents the same size of the first pair. In some species of other orders like Passeriformes (Bulatova, 1973) Strigiformes (Renzoni and Vegni-Talluri, 1966) and Falconiformes (De Boer, 1975 and 1976, Harris and Walters, 1982), the Z chromosome also occupies the first possition in the karyotype.

In that cases, the sexual chromosome Z does not present significant variation of size, since during the diversification of species of birds there occured pericentric inversions wich changed its morphology without changing its size.

In birds the W chromosome passed through greater modifications in its karyotypic evolution than the Z chromosome. Its morphology varies from metacentric to acrocentric and may occupy most different positions within the karyotype.

The order Piciformes represents a group with a general tendency of having a large diploid chromosme number.

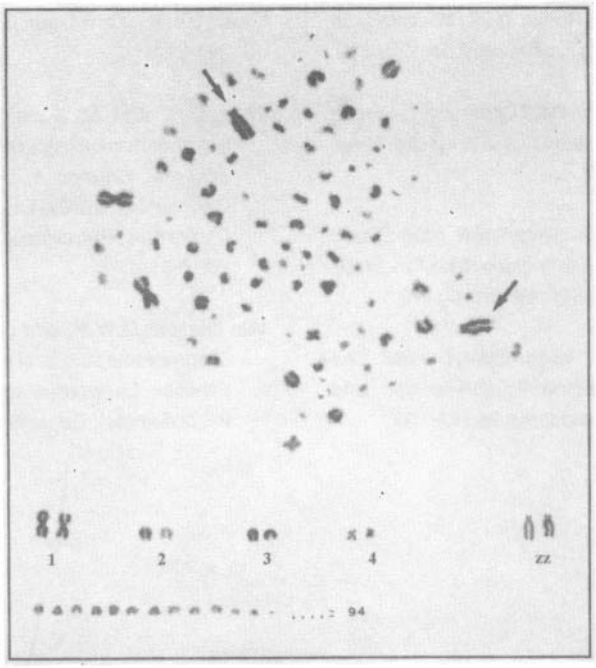

Figure 4. *Metaphase and partial karyotype of a male* Ramphastos vitellinus. *Arrows indicate the sexual chromosomes.* (Metafase y cariotipo parcial de un macho de *Ramphastos vitellinus*. Las flechas indican los cromosomas sexuales).

According to Takagi and Sasaki (1980), the karyotype of *Chunga burmeister* is surprisingly similar to that of *R. toco* wich is characterized as a remote systematic group.

The fact that *R. dicolorus* and *R. vitellinus*, different from *R toco* present a small acossomal metacentric pair, indicate a mechanism of centric fusion of microchromosomes as a process of karyotypic evolution and increase of the number of macrochromosomes within this genus.

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