

Cytogenetics of some ant species of the tribe Attini (Hymenoptera, Formicidae) from the region of Viçosa, MG

Marcos Antônio Mattiello Fadini and Silvia das Graças Pompolo

ABSTRACT

A cytogenetic study was performed on seven species, belonging to three genera of the tribe Attini (Hymenoptera, Formicidae) in the region of Viçosa, MG, Brazil. *Atta sexdens rubropilosa*, *A. bisphaerica* and *A. laevigata* all presented $2n = 22$ chromosomes (12 metacentrics, six submetacentrics and four acrocentrics); *Acromyrmex s. subterraneus*, *A. molestans* and *A. crassipinus* presented $2n = 38$ chromosomes (two metacentrics, six submetacentrics, 16 subtelocentrics and 14 acrocentrics); *Apterostigma* sp. presented $2n = 20$ chromosomes (six metacentrics, 12 submetacentrics and two acrocentrics). A constancy in karyotype was observed among species of the genera *Atta* and *Acromyrmex*. The cytogenetic proximity of the three genera is discussed.

INTRODUCTION

Studies carried out on more than 500 ant species have shown that the chromosome number frequency distribution is bimodal, with an antimode of $n = 12$, and that the ants can be divided into species with low ($n \leq 12$) and high chromosome numbers ($n > 12$) (Imai *et al.*, 1988). The data suggest that the ant's ancestral karyotype must have had a small chromosome number and that an increase occurred through centric fission, with pericentric inversion converting acrocentrics to other chromosome types. Centric fusion occurred occasionally, but the direction of the evolutionary process was an increase in chromosome number (Imai *et al.*, 1977, 1988).

The genus *Atta* occurs only in the American continents from southern United States to central Argentina (excluding Chile). Nine species have been detected in Brazil, with *Atta sexdens* having the widest distribution (Gonçalves, 1960).

Acromyrmex is distributed from California to Patagonia. There is no report of its occurrence in Chile (Gonçalves, 1961). Cytogenetic analyses of three *Acromyrmex* species have been carried out in Uruguay, showing a chromosome number of $2n = 38$ (Goñi *et al.*, 1983).

MATERIAL AND METHODS

Seven species of ants of the tribe Attini were analyzed: *Apterostigma* sp. (four colonies), *Atta sexdens rubropilosa* (six colonies), *A. laevigata* (six colonies), *A. bisphaerica*, *Acromyrmex s. subterraneus*, *A. molestans* and *A. crassipinus* (one colony each) from the region of Viçosa, MG ($20^{\circ}45'S$, $42^{\circ}52'W$). Cytogenetic analysis was made of cerebral ganglion metaphases from 15 females in the prepupal phase per colony, by the technique of Imai *et al.* (1988).

The metaphases of best quality were photographed and then mounted in the following order:

metacentrics, submetacentrics, subtelocentrics and acrocentrics, in decreasing order of chromosome size.

RESULTS AND DISCUSSION

The *Atta* spp. had a chromosome number of $2n = 22$ chromosomes: 12 metacentrics, six submetacentrics and four acrocentrics for the three species analyzed (Figure 1).

All the *Acromyrmex* spp. presented $2n = 38$ chromosomes: two metacentrics, six submetacentrics, 16 subtelocentrics and 14 acrocentrics (Figure 2).

Apterostigma sp. presented $2n = 20$ chromosomes: six metacentrics, 12 submetacentrics and two acrocentrics (Figure 3).

The karyotypes of the species of the genus *Atta* studied were morphologically similar (Figure 1), as was also observed for the *Acromyrmex* species analyzed (Figure 2).

Species of *Atta* ($n = 11$) and *Apterostigma* ($n = 10$) are classified, according to Imai *et al.* (1988), as having a low chromosome number, whereas species of the genus *Acromyrmex* ($n = 19$) are classified as having a high chromosome number. Chromosome alteration during karyotypic evolution in ants has followed the direction

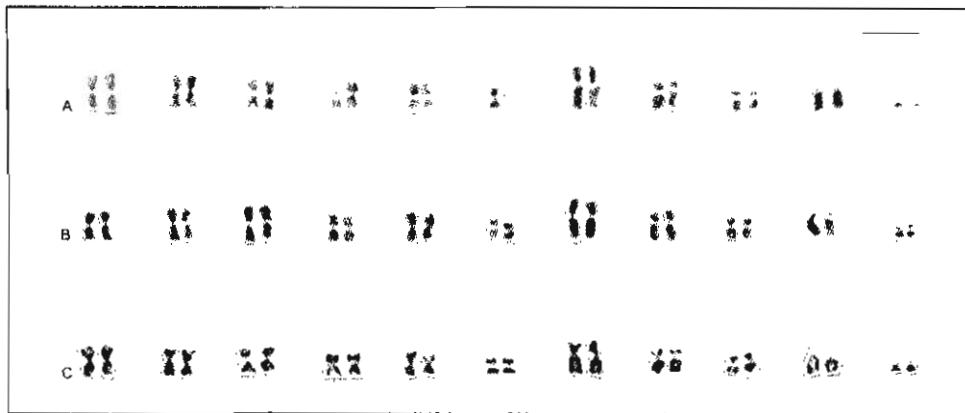


Figure 1 - *Atta bisphaerica*, female with $2n = 22$ chromosomes (A); *A. laevigata*, female with $2n = 22$ chromosomes (B) and *A. sexdens rubropilosa*, female with $2n = 22$ chromosomes (C). Bar represents $5 \mu\text{m}$.

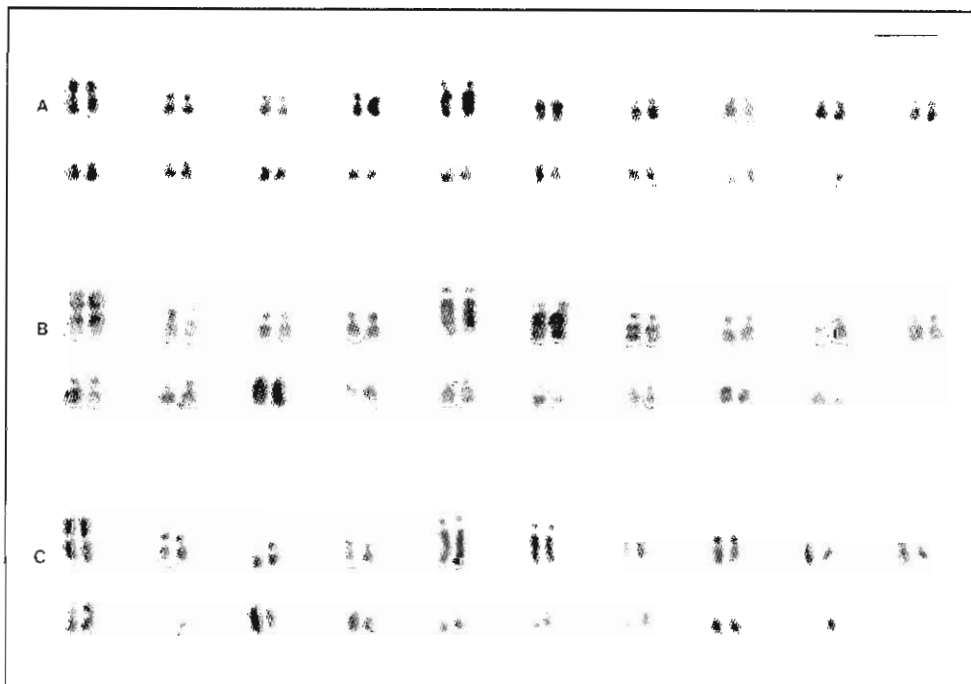


Figure 2 - *Acromyrmex molestantis*, female with $2n = 38$ chromosomes (A); *A. s. subterraneus*, female with $2n = 38$ chromosomes (B) and *A. crassipinus*, female with $2n = 38$ chromosomes (C). Bar represents $5 \mu\text{m}$.

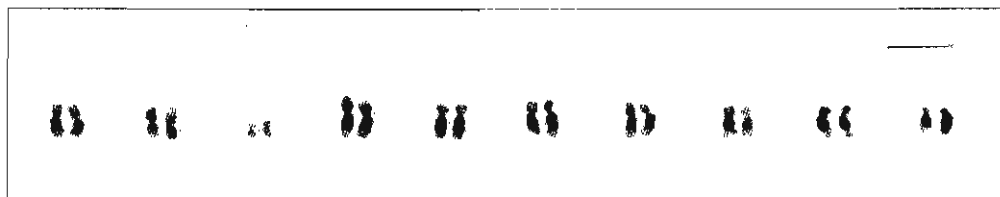


Figure 3 - *Apterostigma* sp., female with $2n = 20$ chromosomes. Bar represents 5 μ m.

metacentric \rightarrow submetacentric \rightarrow telocentric \rightarrow acrocentric, through a mechanism of centric fission, in which heterochromatin converted telocentrics to acrocentrics, recovering telomeric stability (Imai *et al.*, 1988). The presence of two acrocentric chromosome pairs in the karyotype of the three species of *Atta* (Figure 1) suggests the occurrence of two centric fissions in metacentric chromosomes.

Goñi *et al.* (1983), in a study of three different species of the genus *Acromyrmex* in Uruguay, found a karyotype of $2n = 38$ chromosomes (two metacentrics, six submetacentrics, 16 subtelo-centrics and 14 acrocentrics). We detected the same karyotype constitution in this genus, demonstrating that this neotropical genus is quite stable at the karyotype level. The same can be said for the genus *Atta*.

The genus *Apterostigma* is considered to be primitive in the tribe Attini, and *Acromyrmex* and *Atta* are taxonomically closer to each other than to *Apterostigma* (Wilson, 1971). This is supported by our data: *Apterostigma* presented the lowest number of chromosomes ($2n = 20$), suggesting a primitive status. A cytogenetic comparison of these three genera shows that *Acromyrmex* has the most derived karyotype ($2n = 38$ chromosomes), due to the greatest proportion of acrocentric chromosomes, according to the minimum interaction hypothesis of Imai *et al.* (1988).

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RESUMO

O presente trabalho refere-se à citogenética de três gêneros da tribo Attini (Hymenoptera, Formicidae) na região de Viçosa, MG, Brasil. *Atta sexdens rubropilosa*, *A. bisphaerica* e *A. laevigata* apresentaram $2n = 22$ cromossomos (12 metacêntricos, seis submetacêntricos, quatro acrocêntricos); *Acromyrmex* s. *subterraneus*, *A. molestans* e *A. crassipinus* apresentaram $2n = 38$ cromossomos (dois metacêntricos, seis submetacêntricos, 16 subtelo-cêntricos, 14 acrocêntricos); *Apterostigma* sp. apresentou $2n = 20$ cromossomos (seis metacêntricos, 12 submetacêntricos, dois acrocêntricos). Observou-se entre as espécies do gênero *Atta* e *Acromyrmex* uma constância no cariótipo. A proximidade citogenética entre estes três gêneros é discutida.

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