

SHORT COMMUNICATION

IDENTIFICATION OF THE KARYOTYPE OF *Drosophila zottii*: METAPHASE CHROMOSOMES

Silvio Gomes Monteiro, Rosana de Almeida, Nilda Maria Diniz and Fábio de Melo Sene

ABSTRACT

We describe the karyotype of *Drosophila zottii*, one of the seven species of the *repleta* subgroup of the *repleta* group. The metaphases analyzed showed four chromosome pairs ($2n=8$), thus indicating fusion of two pairs when compared to the basic metaphase structure of the *repleta* subgroup. The chromosome fusions (2-3F and 4-5F) detected in this species may contribute to a better understanding of the phylogenetic relationships of the *repleta* subgroup or of other subgroups.

INTRODUCTION

Drosophila zottii (Vilela, 1983) is one of the seven species of the *repleta* subgroup in the *repleta* group of the genus *Drosophila* (Tosi *et al.*, 1990). Because of several factors and because they represent excellent material for genetic analysis, the flies of the genus *Drosophila* provide an appropriate biological model for ecologic and evolutionary studies, which require an understanding of intra- and interspecific variability.

Morphology of male genitalia, reproductive isolation, inversions in polytene chromosomes, analysis of mitochondrial or genomic DNA polymorphism, electrophoretic patterns (enzyme polymorphism), courting sound, and metaphase chromosome morphology are some of the markers used in studies of variability.

According to Dobzhansky (1973), the study of the chromosomes of one species or of a set of species is of great importance for the understanding of the evolutionary process of a taxon, since all genetic information is contained in the chromosomes. Thus, numerical (fissions and fusions) and structural chromosome changes (translocations, deletions, duplications, and inversions)

provide the basis for the determination of phylogenetic relationships.

The objective of the present study was to study the configuration of metaphase chromosomes of *Drosophila zottii* as a contribution to the understanding of the phylogenetic relations among the species of the *repleta* subgroup and of other subgroups of the *repleta* group.

MATERIAL AND METHODS

D. zottii larvae were obtained from isofemale lines D86N23 and D86N24 maintained in the Laboratory of Genetics and Evolution, FMRP-USP. These isofemale lines were established from specimens collected in Nova Friburgo, RJ, (22°22'S and 42°45'W) on March 27, 1992. The stocks are maintained at $25 \pm 1^\circ\text{C}$ in 1/10 liter flasks containing culture medium prepared with crushed corn (11 water, 10 g agar, 18 g brewer's yeast, 40 ml honey, 80 ml malt, 10 g soy four, 8 g crushed corn, and 15 ml nipagin).

Metaphase chromosomes of *D. zottii* were obtained from the cerebral ganglion of 3rd-instar larvae by the technique of Baimai (1977). Chromosome fusions were determined by squashing salivary glands from 3rd-instar larvae in 2% lactic acid orcein.

RESULTS AND DISCUSSION

The species of the subgroup *repleta* present a basic number of six chromosome pairs. However, the

metaphases analyzed here presented four chromosome pairs: one larger pair and one smaller pair of metacentric autosomes, one pair of small autosomes (dots) and one pair of telocentric sex chromosomes, which appear as two unequal rods in males and as two equal rods in females (Figure 1).

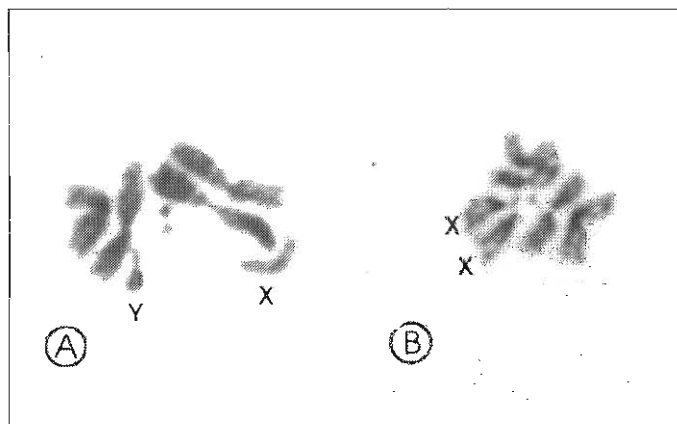


Figure 1 - metaphase chromosomes of *Drosophila zottii* (A - male; B - female).

According to studies on the morphology of the external genitals (Vilela, 1983), *D. zottii* belongs to the subgroup *repleta* and is phylogenetically related to *D. fulvimacula* and *D. fulvimaculoides*. However, when the metaphase plate of *D. zottii* was compared to the basic structure of the subgroup *repleta*, the absence of two chromosome pairs was observed, indicating the occurrence of fusion.

Analysis of polytene chromosomes showed that the metacentric chromosomes were the result of fusion of chromosome 2 with 3 (2-3F) and of chromosome 4 with 5 (4-5F).

These results are quite interesting since they represent the first description of chromosome fusion within the *repleta* subgroup. However, the 2-3F fusion is one of the characteristics of the *mercatorum* subgroup, another subgroup within the *repleta* group.

Controversy about the position of a species within a group arises when morphological data differ from cytological data. An example is *Drosophila peninsularis* (Patterson and Wheeler, 1942) which was initially assigned to the *mercatorum* subgroup (Wharton, 1944) and later transferred to the *mulleri* subgroup because it presented the typical morphology of this subgroup (Wheeler, 1949). Cytologic evidence has led to the removal of *D. peninsularis* from the *mulleri* subgroup (Wasserman, 1960) and to its assignment to the *repleta* subgroup (Wasserman, 1982). However, although *D. peninsularis* does not present the 2-3F fusion, Vilela (1983) transferred it back to the *mercatorum* subgroup on the basis of analysis of the external morphology and of the genitals.

On the basis of our results, we may suggest that *D. zottii* belongs to the *mercatorum* subgroup as it presents the 2-3F fusion characteristic of this subgroup. Alternatively, fusion may be a new characteristic within the *repleta* subgroup, a fact that might be elucidated in polytenic and/or molecular genetics studies.

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RESUMO

O presente trabalho descreve o cariótipo da *Drosophila zottii*, uma das sete espécies do subgrupo *repleta*, do grupo *repleta*. As metafases analisadas mostram quatro pares de cromossomos ($2n=8$), indicando, portanto, fusões de dois pares, quando comparadas a estrutura metafásica básica do subgrupo *repleta*. As fusões cromossômicas (2-3F e 4-5F) encontradas nesta espécie poderão contribuir para um melhor entendimento das relações filogenéticas dentro do subgrupo *repleta* ou de outros subgrupos.

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