

SHORT COMMUNICATION: Photomap of *Drosophila nebulosa* Sturtevant with description of a new inversion in populations from Uruguay

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ABSTRACT

Two Uruguayan populations of *Drosophila nebulosa* were studied for chromosomal polymorphism of paracentric inversions. A new inversion on the second chromosome, named IIR A, was found. The Uruguayan populations and the closest studied populations of *D. nebulosa*, from Porto Alegre, Southern Brazil, were compared. A photomap of the polytene chromosomes of this species was constructed.

INTRODUCTION

Drosophila nebulosa Sturtevant, a neotropical species belonging to the *willistoni* group, is widely distributed from the U.S.A., West Indies, Mexico to Brazil and Peru (Da Cunha *et al.*, 1953; Wheeler, 1970; Val *et al.*, 1981). It is a common species in xeric environments and open formations, typical of savannahs and caatingas of Central Brazil (Dobzhansky and Pavan, 1950; Martins, 1987).

Cytological studies on the polytene chromosomes in *D. nebulosa* were first described by Pavan in 1946 and Da Cunha *et al.* 1953. Since then, evolutionary studies on natural populations in the *willistoni* group, including *D. nebulosa*, have been developed by Valente and coworkers (Valente and Araújo, 1985, 1986; Valente and Morales, 1985; Valente *et al.*, 1989, 1993). Using both ecological and cytogenetical approaches, Bonorino and Valente (1989)

and Bonorino *et al.* (1993) studied natural populations of *D. nebulosa* from urban localities of Porto Alegre, South Brazil, collected between May 1985 and April 1987. During this period, the climatic conditions in this city were exceptionally favorable (hot and dry) for this species. From these studies, the authors conclude that polymorphism estimates of *D. nebulosa* from these localities are related to the microenvironmental characteristics of the sampling sites. Furthermore, new arrangements for chromosome III were found in these populations (see Regner *et al.* 1991), not previously described by Pavan (1946) or Da Cunha *et al.* (1953) in samples from Southeastern Brazil.

This report is part of a systematic study of evolutionary genetics of natural populations of the *willistoni* group in regions apparently marginal for this species group.

MATERIAL AND METHODS

The *D. nebulosa* studied emerged from rotten fruits collected in two suburban regions of Montevideo city (34°50'S, 56°10'W), 2.8 km apart (see Table I). Late third instar female larvae from F₁ mass matings were

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used to analyze salivary gland chromosomes, according to the technique of Ashburner (1967). The chromosome configurations of inversions were compared with the descriptions of Pavan (1946), Da Cunha *et al.* (1953) and Regner *et al.* (1991).

A photomap of the polytene chromosomes from strain (# 8A208) of *D. nebulosa*, from Porto Alegre city (30°10'S; 51°06'W), Southern Brazil, was constructed according to the reference map drawing of Pavan (1946), in which chromosome III was the only subdivided one.

RESULTS AND DISCUSSION

Table II shows the heterozygous inversions and other chromosomal polymorphism features found in *D. nebulosa* from Uruguay. A heterozygous inversion in the right arm of the second chromosome was detected at a very low frequency in the "Jardín Botánico" population. This inversion, named IIR A, has break points in the medium portions of sections 66 and 69 (see Figure 1), and its location on the chromosome is indicated in

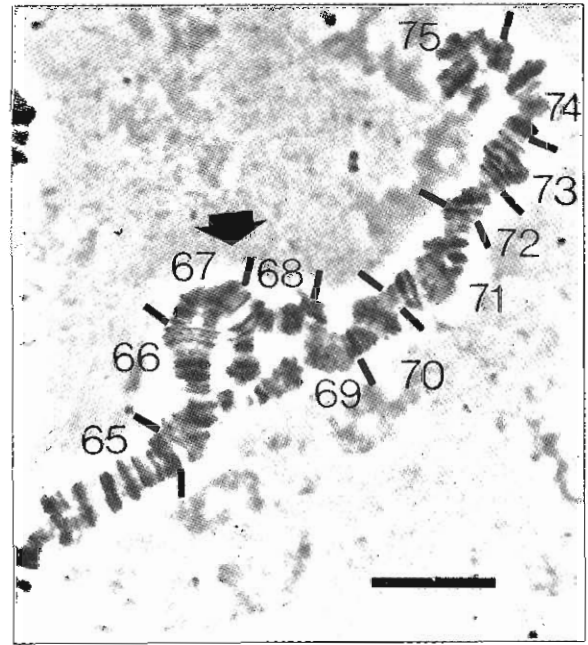


Figure 1 - Heterozygous inversion IIR A found in the right arm of the second chromosome of an Uruguayan population of *Drosophila nebulosa* (arrow). Bar represents 10 μ m.

Table I - Distribution of *Drosophila nebulosa* collected in each sample in Montevideo.

Sample site	Date	Bait	% <i>D. nebulosa</i>	N
1. "Jardín Botánico"	March, 1990	<i>Syagrus romanzoffiana</i>	100	80
2. "Facultad de Agronomía"	April, 1991	<i>Gingko biloba</i>	5	363

Table II - Percent frequency of chromosome inversions, total heterozygosis and mean number of inversions of the IIR and III chromosome of *Drosophila nebulosa* from Montevideo populations.

Chromosome arm	Inversions	Sample site (as Table I)	
		1	2
IIR	A	2	0
	Total inversion heterozygotes (%)	2	0
	Larvae analyzed	111	52
	Mean No. inversions/chromosome arm	0.02	0
III	B	39.6	50
	G	11.0	1.9
	A	3.6	9.6
	H	1.8	13
	C	0.9	9.6
	L	0	1.9
	Total inversion heterozygotes (%)	50	65
	Larvae analyzed	111	52
Mean No. inversions/chromosome arm	0.6	0.9	
Mean No. inversions/female/sample	0.6	0.9	

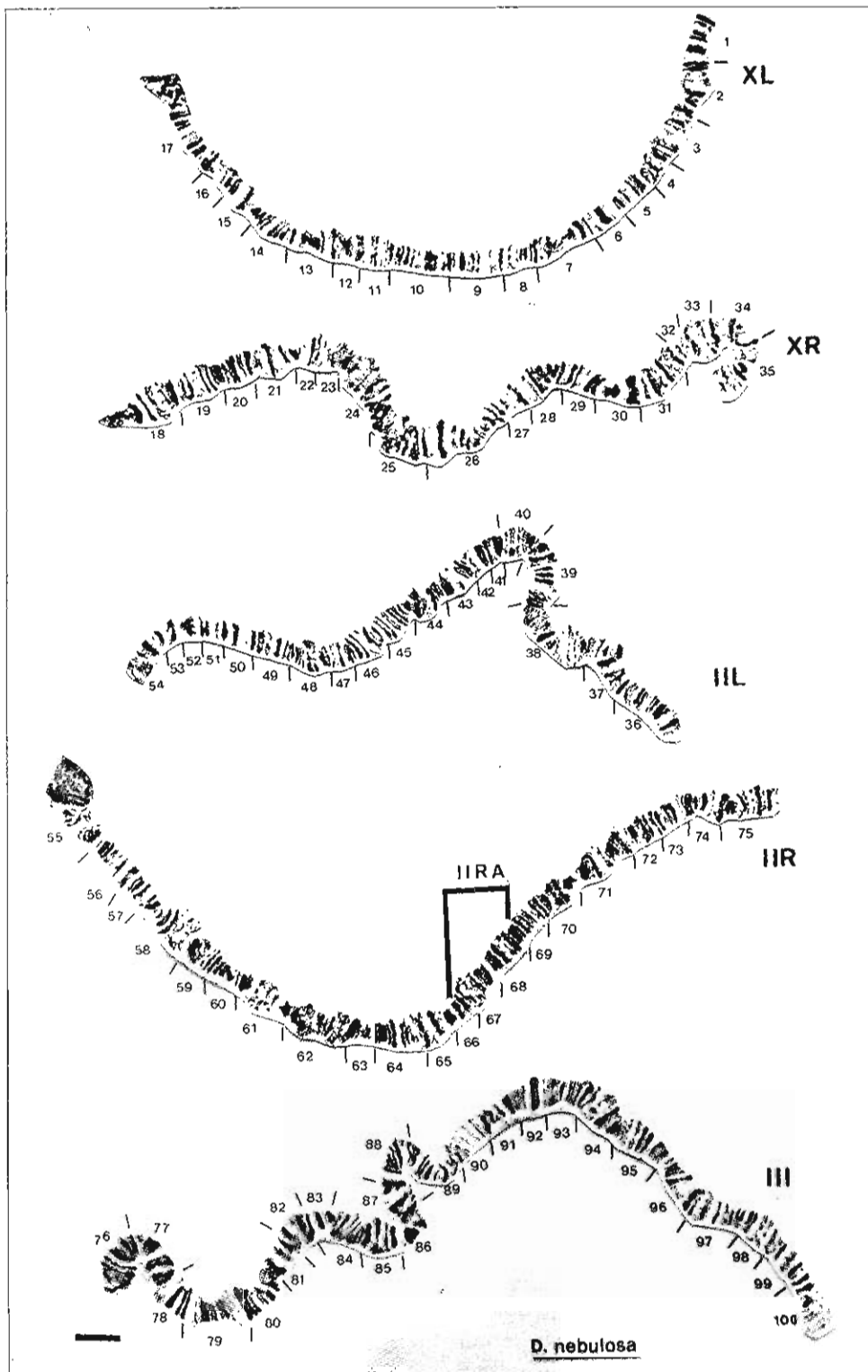


Figure 2 - Photomicrograph of the polytene chromosomes of *Drosophila nebulosa*. The material was prepared according to Ashburner (1967) and the sections were subdivided after Pavan (1946). Bar represents 10 μm .

Figure 2. With this exception, inversions in the second chromosome in *D. nebulosa* have never been observed. The remaining six inversions detected in Montevideo (all of them in the third chromosome) have also been observed in Porto Alegre (Bonorino *et al.*, 1993). Despite

the small number of populations sampled, the chromosome polymorphism estimates in the Uruguayan populations showed levels comparable to those nine Southern Brazilian populations (Bonorino *et al.*, 1993). In terms of common inversions, the populations of these

two regions were remarkably similar. For instance, the III L inversion described first in material from Porto Alegre (Regner *et al.*, 1991) was also observed in Uruguayan samples. The frequency of this inversion in the Montevideo samples was apparently lower than those of Porto Alegre populations, 1.9% and 4.9% respectively (Bonorino *et al.*, 1993). However, the III H inversion, the second most common inversion in Porto Alegre populations (average value 30.6%), was poorly represented in the Uruguayan populations (see Table II).

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RESUMO

Duas populações uruguaias de *Drosophila nebulosa* foram estudadas quanto ao seu polimorfismo cromossômico para inversões paracêntricas. Foi encontrada uma nova inversão no segundo cromossomo, que chamamos IIR A. As populações uruguaias e as populações estudadas mais próximas de *D. nebulosa*, como as de Porto Alegre, no sul do Brasil, foram comparadas e discutidas em relação às características do polimorfismo cromossômico. Para a realização da análise citológica dos cromossomos politênicos em *D. nebulosa*, nós construímos o fotomapa dos cromossomos politênicos desta espécie.

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