Tripathy, N.K., D.P. Dasmohapatra and C.C. Das. Berhampur University, Orissa, India.

Chromosomal polymorphism in D. ananassae.

Abundant evidence now exists to prove that differential gene arrangements have evolved in many species of Drosophila to meet the adaptive needs in a dynamic environment. Inasmuch as the adaptive values of different genomes differ considerably, the fitness of certain kinds of gene arrangements may, therefore, increase or decrease with fluctuation in environmental milieu. D. ananassae, a cosmopolitan domestic species, is known to exhibit nearly 50 different inversions in different natural populations. Of the several paracentric inversions, 3LA, 3RA and 2LA are common to all populations while the rest of the inversions are selectively restricted to these populations. From their studies on D. willistoni, da Cunha et al. (1950) postulate a close correlation of chromosomal polymorphism with environmental conditions. In an attempt to assess the correlation, if any, between the different inversions and the environmental temperature, the present study has been undertaken on the natural population of D. ananassae of Golabandha, situated at an altitude of 17.5 m and about 6 km to the south of the university campus, during the months of January through May, 1980. The temperature during these months was recorded as 24°C in January, 28°C in February and March, 32°C in April and 36°C in May.

Table 1. Inversion frequencies.

Type of inversion	Jan.	Feb.	Mar.	Apr.	May	Percentage
3LA	35	30	27	23	34	29.8
3RA	3	2	2	2	5	2.8
2LA	4	7	11	10	11	8.6
XLA	1	-	-	-	-	0.2

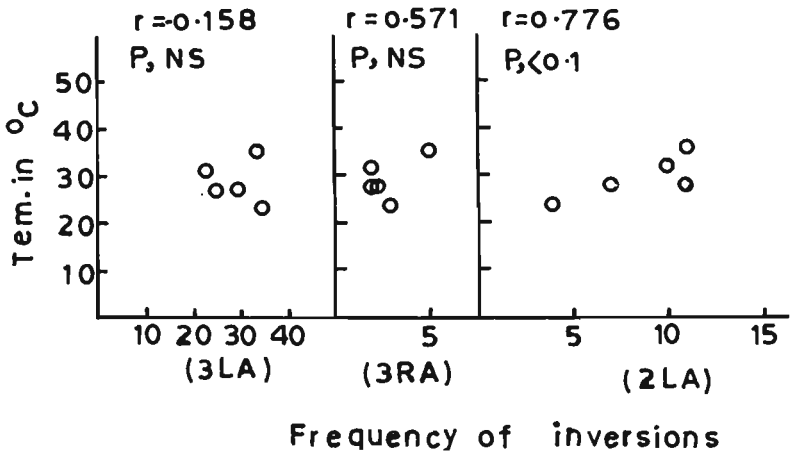

Fig. 1. Correlation between frequency of inversions (3LA, 3RA and 2LA) and environmental temperature in °C.

Collections were made in the first week of every month and the naturally inseminated gravid females were isolated. Individual flies were transferred to independent vials with wheat cream agar medium. 100 larvae were used in studying the inversions every month. Table 1 lists the inversion frequency data during the different months of study.

The correlation graphs of the frequency of inversions, coextensive with the species, and the temperature fluctuation during these months are represented in Fig. 1. As can be seen there is no significant correlation between the frequency of these inversions and the environmental temperature in the investigated population of D. ananassae.

Reference: da Cunha, A.B., H. Burla and Th. Dobzhansky 1950, Evolution 4:212.

Trippa, G., A. Loverre and M. Lepore. Università di Roma, Italy.

Segregation distortion of second chromosomes by a wild third chromosome in D. melanogaster: modifier or Sd gene?

Samples of wild populations of D. melanogaster from southern Italy have shown a frequency of 1 to 10% of second SD chromosomes (Trippa et al. 1972) and about 70% of third chromosomes carrying a dominant Sd modifier (Trippa and Loverre 1975). The characterization of Italian natural populations as regards frequency of meiotic drive systems utilizes a cross scheme which makes it possible to follow the segregation of both second and third chromosomes. F_1 +/bw-5; +/st-5 males from the cross between wild males and y; bw-5; st-5 females are backcrossed with y; bw-5; st-5 females to permit a first count of k_1 and k_2 at F_2 (k_1 for segregation of second chromosome = bw^+ individuals/

total progeny; k_2 for segregation of third chromosomes = st^+ individuals/total progeny). A further count of k_1 and k_2 in the progeny of F_2 males makes it possible to evaluate the degree of distorted segregation of chromosomes 2 and 3 and their reciprocal effects on segregation.

A study on two wild populations collected in October 1978 in northern Italy (Mareno, Veneto) and in southern Italy (Nardò, Puglia) has led to the recovery of a third chromosome, III^{Nr} ($III^{Nardò}$) which alters the segregation of second chromosomes (Table 1). This chromosome normally segregates in III^{Nr}/st heterozygous males (n = 41; k = 0.53). As things stand at present, two general hypotheses can be put forth to interpret the results obtained: (1) there may be an Sd-like factor acting like other Sd factors so far detected on the second chromosome but located on the third chromosome; (2) there may be on chromosome 3 an Sd modifier (enhancer?) acting on the II^+ Nardò chromosome (which is actually an SD chromosome, despite the fact that in the +/bw-5; st-5/st-5 heterozygous males k = 0.51) thus causing segregation distortion of second chromosomes. The frequency of genotypes with the SD trait which is a consequence of the interaction of wild chromosomes II and III is in the Mareno population 0.00% (0/137 chromosomes) and in the Nardò population about 0.03% (3/108 chromosomes). In the Nardò population, besides #13, there are two examples of SD with k value equal to 0.67 in +/bw-5; st-5/st-5 males and 1.00 in +/bw-5; +/st-5 males. These data indicate that there is a significant difference (P >> 0.001) in the $\bar{k}$ values of the two genotypes and that this difference depends on the presence of wild third chromosomes which enhance distortion by the wild second chromosome.

Table 1. Effect of the III^{Nr} chromosome on the segregation of second chromosomes.

Cross	♂ $\frac{+}{bw\text{-}5}\ \frac{st\text{-}5}{st\text{-}5}$ x ♀ bw-5; st-5			♂ $\frac{+}{bw\text{-}5}\ \frac{+}{st\text{-}5}$ x ♀ bw-5; st-5		
	n	tot. prog.	k ± S.E.	n	tot. prog.	k ± S.E.
#13	13	1100	0.51±0.06	41	3885	0.96±0.05

It is interesting to note that while the Nardò (South Italy) population shows an SD frequency of about 3% (a very similar value to those observed in wild populations from many parts of the world), the Mareno population (North Italy) shows no cases of SD. This is the second example of a wild population with no cases of SD, after that extensively examined in Austin, Texas (see Hartle and Hiraizumi 1976). If it is true that one of the mechanisms contrasting the spread of SD in populations is the appearance and increase of normal chromosomes resistant to Sd, it would be particularly stimulating to test the degree of sensitivity to distortion by Sd of the second chromosomes of these two populations.

References: Hartl and Hiraizumi 1976, in: Genetics and Biology of Drosophila (Ashburner and Novitski, eds.) vol. 1b; Trippa et al. 1972, DIS 49:81; Trippa and Loverre 1975, Genet. Res. 26:113.

Tsakas, S.C. Agricultural College of Athens, Athens, Greece. Chromosomal breaks and alteration in staining observed in vitro after ultrasonication of salivary glands of D. subobscura species.

It is known that many chemical agents and physical factors produce chromosomal breaks and aberrations. The purpose of this work was to discover if ultrasonics also have an effect of this kind in vitro.

Salivary glands of the "Küsnacht" strain, first pupal stage, were used. This strain has a standard/standard chromosomal structure for the five long chromosomes, X, O, U, E, and J. Tap water was used as dissecting solution; its chemical analysis is as follows: pH = 7.2; SO_4^{--} = 30 mg/l; NO_3^- = 2 mg/l; Cl^- = 34 mg/l; HCO_3^- = 150 mg/l; Ca^{++} = 60.1 mg/l; Fe^{++} = 0.2 mg/l; Mg^{++} = 29.4 mg/l; Cl_2 free = 0; hardness: $CaCO_3$ = 150 mg/l, the remaining = 32 mg/l; total = 182 mg/l. The staining solution was composed of 2 g of synthetic orcein (Edward Gurr, Ltd., London) dissolved into 50 ml hot glacial acetic acid, plus 50 ml of 85% lactic acid after removing from heat (Strickberger 1962).

Immediately after dissection of eight pairs of salivary glands, four of these pairs were placed on one slide and four on another. Each slide contained one drop of dissecting solution. One slide was kept as a control and the other was placed under the sonicator's microphone. A TECH Ultrasonicator (company, Japan) was used, with a crystalic twiter microphone.