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Quantitative courtship acts of 2LA inversion homo- and heterokaryotypes of *Drosophila ananassae.*

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Relationship between inversions, morphological traits, and fitness characters has been well documented in *Drosophila*. The relationship between inversions and behavioral traits, however, has not been studied. The present study has, therefore, been carried out to find out the effect of inversions on courtship acts in *Drosophila ananassae*. Homozygous 2LA inversion stock of *D. ananassae* was established from the females collected at semi domestic locality of Dharwad, India. This stock was maintained at 21 ±1ºC and relative humidity of 70% for ten generations. Before starting the experiments the inversion heterokaryotypes were generated by crossing males with homokaryotic inversion with normal female or vice versa. When the progeny appeared, the virgin females and bachelor males were isolated, kept separately, aged for five days, and used for observation of courtship behavior. The courtship behavior of males and females was observed by confining a bachelor male and a virgin female of a given type in an Elens-Wattiaux mating chamber. A total of twenty five pairs of the following combinations were studied: a. both male and female heterokaryotypic, b. male homokaryotypic and female heterokaryotypic, c. both male and female homokaryotypic, and d. male heterokaryotypic and female homokaryotypic. The courtship elements were quantified following the procedure of Hegde and Krishna (1997). Following courtship elements such as tapping, scissoring, vibration, circling, licking, ignoring, extruding, and decamping were analyzed. The data gathered were subjected to one way ANOVA.

In the present study (Table 1), it is noticed that male courtship acts such as tapping, wing vibration, scissoring, circling, and licking were less in crosses involving homokaryotypic male and female than in crosses involving heterokaryotypic male and females with 2LA inversion. The female courtship activities ignoring, extruding, and decamping were higher in crosses involving both homokaryotypic male and homokaryotypic female than in crosses involving both male and female heterokaryotypic to 2LA inversion. The courtship activities of crosses involving a homokaryotypic male with another homokaryotypic female were lower than the crosses involving heterokaryotypes. Thus the male's activity was higher in pairs where both male and female are heterokaryotypes or else one of the two sexes is heterokaryotypic. This agrees with the findings of Spiess *et al* (1966), who

observed heterosis associated with male sexual activity in a few chromosomal inversions of *D. pseudoobscura*. The present result also supports the findings of Singh and Chatterjee (1986), who demonstrated that the males with different karyotypes show considerable differences in mating activity.

Table 1. Quantitative courtship acts of 2LA inversion homo and heterokaryotypes of *Drosophila ananassae* (Values are Mean ± SE).

Parameters	Both male and female heterokaryotypic	Male homokaryotypic and female heterokaryotypic	Both male and female homokaryotypic	Male heterokaryotypic and female homokaryotypic	F.value
Tapping	12.64 ± .44^{c}	10.16 ± .49^{b}	8.24 ± .42^{a}	12.48 ± .44^{c}	12.46**
Scissoring	13.52 ± .42^{c}	11.84 ± .48^{b}	9.48 ± .58^{a}	12.88 ± .40	15.46**
Vibration	14.48 ± .51^{c}	12.68 ± .43^{b}	10.04 ± .37^{a}	13.52 ± .39^{c}	19.71**
Circling	6.36 ± .34^{c}	4.48 ± .26^{b}	3.36 ± .23^{a}	5.68 ± .26^{c}	22.27**
Licking	4.96 ± .24^{c}	3.88 ± .23^{b}	2.84 ± .25^{a}	4.76 ± .22^{c}	16.35**
Ignoring	3.20 ± .26^{a}	2.64 ± .25^{a}	5.12 ± .32^{b}	4.64 ± .45^{b}	12.09**
Extruding	2.92 ± .27^{a}	2.60 ± .24^{a}	4.16 ± .28^{b}	4.20 ± .26^{b}	9.66**
Decamping	2.40 ± .18^{a}	2.04 ± .09^{a}	3.36 ± .32^{b}	3.72 ± .28^{b}	11.19**

**P< 0.001.
Same letter in superscript in each row indicates non-significant by Tukey's test.

This suggests that the inversion heterokaryotypes perform greater courtship acts than homokaryotypes. Studies have shown that flies which perform greater courtship act during courtship had greater mating success, inseminated more females, and showed greater adaptability than flies which lesser activity during courtship (Hegde and Krishna, 1997). This is in conformity with earlier work of Da Cunha (1955) and Dobzhansky and Wallace (1953). They also found that heterozygote individuals have better adaptability than the homozygotes. Therefore this study suggests that heterokaryotype of 2LA inversion has greater courtship activities than homokaryotype.

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