

The present investigations can be considered as an evolutionary experimentation through hybridization under laboratory conditions. These races which are at different stages of evolutionary divergence offer a rare opportunity to study the process of riation (speciation?), under laboratory conditions. The *nasuta-albomicans* complex of *Drosophila*, the members of which are in the process of evolving, is a unique model system to witness the process and the pattern of sibling riation/speciation as well as the analysis of chromosomal and molecular basis of riation.

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ACKNOWLEDGEMENT. Financial assistance from DST, New Delhi, is gratefully acknowledged.

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Evidence for positive assortative mating within *Drosophila bipectinata*

Sexual (or ethological) isolation, which is a premating barrier to gene exchange between Mendelian populations, is the most important class among the different ways of reproductive isolation in animal species. This plays an important role in evolution. The phenomenon of sexual isolation has been extensively studied in the genus *Drosophila* and has been found to be widespread^{1,2}. Incipient reproductive isolation occurring between geographic strains of the same species has been reported in many *Drosophila* species, which corroborates the hypothesis that incipient isolation originates as a side-effect of genetic divergence¹⁻³. Although a lack of assortative mating between mutant and wild type *D. melanogaster* has been reported⁴⁻⁶, selective mating has also been found in some cases^{7,8}. Rendel⁹ found selective mating (non-random) between yellow mutant and wild type with yellow males.

Drosophila bipectinata is a member of the *bipectinata* species complex of the

ananassae subgroup of the *melanogaster* species group. Population and behaviour genetical studies in this species have been initiated in our laboratory¹⁰⁻¹⁴. *D. bipectinata* shows incomplete sexual isolation with other members of the *bipectinata* complex¹⁵. It is also characterized by incipient sexual isolation between different geographic strains¹¹. Spontaneous mutations have been detected in this species¹⁶⁻¹⁸. Effects of mutations on mating propensity and pattern of mating have also been tested¹⁹⁻²¹. We detected flies with bilateral outgrowths on thorax which is a unique phenotypic change in *D. bipectinata*¹⁷. A separate stock of mutant with outgrowths could be established. During the present study, we tested the pattern of mating between wild type and mutant (possessing bilateral thoracic outgrowths) *D. bipectinata* and the results are reported here.

During the present study, the wild type (TD) and mutant (OG) stocks of *D. bipectinata* were used. In mutant stock, flies

possess bilateral outgrowths on thorax. Originally, this unique phenotypic change was detected in sepia eye colour mutant stock¹⁷. By making cross between sepia mutant with outgrowths and wild type, flies with red eye and outgrowths were obtained and a separate stock of red-eyed flies with outgrowths was established, which was used in mating propensity tests.

In mating propensity tests, multiple-choice method was used and mating success was studied by direct observation in an Elens-Wattiaux mating chamber kept in a room maintained at approximately 24°C under normal laboratory light conditions between 7 and 11 AM. Virgin females and males were collected from both the stocks and flies were aged for seven days. In multiple-choice experiment, 15 flies of each sex were used and five trials were run. Fifteen females of each of the two stocks were introduced into the mating chamber with 15 males of each of the two strains and were

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Table 1. Number of matings in 60 min in the mating chamber containing 15 flies of each sex from outgrowth mutant (OG) and wild type (TD) *Drosophila bipectinata* in multiple-choice experiment

Replicates	OG ♀ × OG ♂	TD ♀ × TD ♂	TD ♀ × OG ♂	OG ♀ × TD ♂	Isolation estimate	χ^2
1	4	5	2	4		
2	6	6	2	5		
3	2	7	2	1		
4	7	6	2	4		
5	3	5	1	3		
Total	22	29	9	17	0.51	8.12*

*Significant ($P < 0.01$).

Table 2. χ^2 for 1:1 ratios on marginal totals to assess the relative mating propensities of wild type (TD) and outgrowth (OG) flies of both the sexes of *Drosophila bipectinata*

	♂	TD	OG	Total
♀	TD	29	9	38
	OG	17	22	39
	Total	46	31	
χ^2 TD, OG ♀	0.00012	$P > 0.05$		
χ^2 TD, OG ♂	2.94	$P > 0.05$		

observed for 60 min. When a pair commenced mating, it was aspirated out and the type of mating individuals was recorded. Total number of flies in each replicate was 60, and sex ratio was 1 female: 1 male.

Table 1 shows the results of multiple-choice experiment involving two strains of *D. bipectinata*. In all the replicates homogamic matings (mating between the female and male of the same type) are more frequent than heterogamic matings (mating between female and male of different types). Under the assumption of random mating, the difference between the number of homogamic and heterogamic matings was tested by calculating χ^2 . For the pooled data, the χ^2 value of 8.12 shows significant difference ($P < 0.01$) between homogamic and heterogamic matings. Thus there is a significant deviation from random mating which shows preferential (non-random or assortative) mating within *D. bipectinata*. The females of one strain prefer their own males and discriminate against alien males. The value of isolation estimate is also low (0.51), indicating sexual isolation

between two types of flies. Table 2 shows the χ^2 values calculated on marginal totals to assess the relative mating propensity of two sexes of both strains. Both types of females are equally receptive. However, wild type males are more successful in mating than mutant males but the difference is not significant statistically. Thus there is no difference in mating propensity of two types of flies.

It is evident from the present results that the thoracic outgrowths in *D. bipectinata* affect mate-recognition system, leading to behavioural reproductive isolation.

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ACKNOWLEDGEMENTS. Financial support from the UGC, New Delhi, in the form of research project to B.N.S. and from BHU in the form of research scholarship to S.S. is gratefully acknowledged.

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