Greater mating success of *Drosophila ananassae* flies possessing high number of sternopleural bristles

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Mating success between *Drosophila ananassae* flies with high and low number of sternopleural bristles has been observed in an Elens–Wattiaux mating chamber by using multiple choice method. Results indicate that females and males with high number of sternopleural bristles are more successful in mating than those with low number of bristles. These findings suggest that mating propensity is influenced by sternopleural bristle phenotypes in *D. ananassae*.

DROSOPHILA ANANASSAE is a cosmopolitan and domestic species. It is a genetically unique species as it possesses several genetic peculiarities[1]. *D. ananassae* has been extensively used for genetical studies including population genetics[1–3], behaviour genetics[4] and recombination[5]. A number of behaviour genetic investigations on *D. ananassae* provide evidence for genetic control of mating propensity[6–9]. There is evidence for rare male mating advantage[10]. Results of sexual isolation tests have revealed the existence of incipient sexual isolation within *D. ananassae*[11]. Larval pupation behaviour in *D. ananassae* is under polygenic control with a substantial amount of additive genetic variation[12,13].

We conducted artificial selection experiments for high and low number of sternopleural bristles in *D. ananassae* and obtained positive response to selection in both directions[14], which demonstrated that sternopleural bristle phenotypes in *D. ananassae* is under polygenic control as has been demonstrated in *D. melanogaster*[15]. We studied mating success of D. *ananassae* flies possessing high and low number of sternopleural bristles and results are described here.

After G_{13} of directional selection, high (H1 & H2) and low (L1 & L2) lines showing significant difference in the mean number of sternopleural bristles could be established. All the four lines were cultured separately in food bottles. Virgin females and males were collected and aged for seven days. From high line females and males with more than 23 bristle number were selected, and from low line flies with less than 14 bristle number were selected. It was observed that flies possessing high number of sternopleural bristles were larger in size than those with low number of chaetae. It is known that body size affects bristle number in *Drosophila*[16]. Since there were two replicates of high line (H1 & H2) and two replicates of low line (L1 & L2), four crosses were made (see Table 1). All the experiments were conducted by direct observation in an Elens–Wattiaux mating chamber kept in a temperature-controlled room at approximately 24°C under normal laboratory light conditions between 7.00 and 11.00 AM. Multiple-choice technique was used. In all the crosses, 15 flies of each sex and of each type were introduced into mating chamber. Thus the total number of flies in each replicate was 60 and sex-ratio was 1:1. In each cross five replicates were run. When a pair commenced mating it was taken out with an aspirator and the type of mating was recorded. Mating was observed for 60 min. In order to identify the flies of different lines in each cross, the females and males of one line were marked with a small spot of marker ink on the scutellum. In each cross, the data of five replicates were pooled and the numbers of matings in different crosses were obtained.

Table 1 shows the numbers of matings between *D. ananassae* flies possessing high and low number of bristles in different crosses. In all crosses, mating between females and males possessing high number of sternopleural bristles is most frequent. However, the other three combinations are equally frequent but less than H females × H males combination. To test selective mating, isolation estimate was calculated using the formula suggested by Merrell[17]. The value of isolation estimate is below one in all the crosses. Isolation estimate ranges from zero to infinity. If isolation estimate is one, there is no sexual isolation between the lines tested. If it is zero, then isolation is complete. The χ^2 values were calculated to measure the difference between

Table 1. Number of matings in 60 min in mating chamber in multiple choice experiment between high (H_1 and H_2) and low (L_1 and L_2) lines of *Drosophila ananassae* after 13 generations of directional selection

Crosses	Number of matings				Isolation estimate	χ^2
	H♀ × H♂	H♀ × L♂	L♀ × L♂	L♀ × H♂		
$H_1 \times L_1$	33	12	14	19	0.66	3.28
$H_2 \times L_2$	29	14	11	14	0.70	2.12
$H_1 \times L_2$	29	13	13	11	0.57	4.91*
$H_2 \times L_1$	26	17	13	10	0.69	2.18
Total	117	56	51	54	0.66	12.10*

*Significant (df = 1).

Table 2. χ^2 for 1:1 ratio on marginal totals to assess the relative mating propensity of high line and low line flies of both sexes of *Drosophila ananassae* (for pooled data of all crosses)

		Males		
		High line	Low line	Total
Females	High line	117	56	173
	Low line	54	51	105
	Total	171	107	
χ^2 high line, low line females		16.64	$P < 0.001$*	
χ^2 high line, low line males		14.74	$P < 0.001$*	

*Significant (df = 1).

homogamic and heterogamic matings under the assumption of random mating. Although the χ^2 values show significant difference (one cross and pooled data) between homogamic and heterogamic matings and isolation estimate remains below one, there is no evidence for selective mating or sexual isolation between high and low lines for sternopleural bristles. Only one type of mating combination, i.e. H females × H males is most frequent. The homogamic matings (L females × L males) are more or less equally frequent to both heterogamic matings. High frequency of matings between high females and high males is due to higher sexual activity of high males and more receptivity of high females compared to low line flies. Table 2 shows the χ^2 values calculated on marginal totals (for pooled data of all crosses) to assess the relative sexual activity of two sexes of both lines. Differences are significant for females and for males. Females and males with high number of sternopleural bristles are more successful in mating than those with low number of bristles. Thus, our results indicate that flies of high line have greater mating success than those of low line and thus mating success in *D. ananassae* is influenced by sternopleural bristle phenotypes. However, there is no evidence for ethological isolation between high and low lines for sternopleural bristle number in *D. ananassae*.

Thoday and Gibson[18] found simultaneous divergence for a polygenic character and ethological isolation by disruptive selection for a morphological character (sternopleural bristle number) in *D. melanogaster*. Both homogamic matings (H × H, L × L) were significantly more frequent than heterogamic matings (H × L, L × H) and there was preference for homogamic matings. However, their data did not reveal difference in mating activity of flies with high and low number of sternopleural bristles. Unfortunately, attempts to repeat these experiments in a number of different laboratories have failed to confirm these findings of Thoday and Gibson[18] in *D. melanogaster*[19]. Our results in *D. ananassae* are also not in agreement with those of Thoday and Gibson[18] in *D. melanogaster* that divergence for polygenic character leads to reproductive isolation in the laboratory. On the other hand, there is clear evidence of the influence of sternopleural bristle phenotypes on mating success in *D. ananassae*.

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Environmental variations in late Quaternary sequence of Kolaghat West Bengal, India

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Paleoenvironmental analysis of late Quat sediment and their biotic contents from onshor of southern West Bengal reveals eight ecol phases. A climatic fluctuation for a short peri been noticed within the prolonged climatic