Bilateral outgrowths on thorax of sepaia eye colour mutants in *Drosophila bipeclinata*

B. N. Singh, Seema Sisodia and Rakhee Banerjee  
Department of Zoology, Banaras Hindu University, Varanasi 221 005, India

Flies with bilateral outgrowths on thorax were detected in sepaia eye mutant stock of *Drosophila bipeclinata*. A separate stock of sepaia mutants with outgrowths on thorax could be established. Expression of this phenotypic change is better in females than in males and there is individual variation in both sexes. In order to understand the mode of inheritance of these outgrowths on the thorax of sepaia mutants, four different crosses involving mutants and wild type flies were made. The proportion of flies with outgrowths on thorax varies in *F₁* and *F₂* generations of different crosses. Such outgrowths on the thorax have not been reported earlier in any species of *Drosophila* and appear to be a unique phenotypic change in *D. bipeclinata* caused due to mutation but its exact nature could not be understood from the results of these crosses.

*D. bipeclinata* is a member of the *bipeclinata* species complex of the *ananassae* subgroup of the *melanogaster* species group. This species is of common occurrence in India. Studies on population and behaviour genetics of this species have been initiated by Indian workers. We detected sepaia eye colour mutation (autosomal reces-

Table 1. Results of crosses involving sepaia eye colour mutants with/without outgrowths on thorax and wild type *Drosophila bipeclinata*

<table>
<thead>
<tr>
<th>Cross</th>
<th>F₁</th>
<th>F₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. sepaia eye colour normal thorax</td>
<td>140</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>2. sepaia eye colour thorax with outgrowths</td>
<td>106</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>72</td>
</tr>
<tr>
<td>3. Red eye colour normal thorax</td>
<td>157</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. sepaia eye colour thorax with outgrowths</td>
<td>157</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>15</td>
</tr>
</tbody>
</table>

Figure 1. Photograph showing sepaia eye mutant of *D. bipeclinata* with bilateral outgrowths on thorax.
sive) in a wild stock of *D. bipectinata* which diminishes sexual activity of males. In sepias mutant stock, 17 females and 10 males showing two outgrowths on dorsal side of thorax were found. Figure 1 shows the photograph of a sepias mutant with two outgrowths on the dorsal side of the thorax. A separate line of sepias mutants showing outgrowths on thorax could be established. It has been observed that there is individual variation in both sexes in expression of this character and generally outgrowths are larger in females than in males. In the stock of mutants showing outgrowths, a few flies are regularly found which do not possess outgrowths on their thorax. In the sepias mutant stock also, a few flies with outgrowths are regularly found.

To understand the mode of inheritance of this unique phenotypic change, four different crosses were made. All the crosses were made in food bottles by using wild type, sepias mutants with and without outgrowths on thorax (normal thorax). In each cross, a large number of $F_1$ flies were observed to score the number of flies with/without outgrowths on thorax. A random sample of 50 flies (females and males in equal number) from $F_1$ were transferred to a fresh food bottle to obtain the $F_2$ generation of each cross. $F_2$ flies were observed to score the different types of flies. Results of all four crosses are presented in Table 1. In reciprocal crosses (1 and 2) between sepias mutants with normal thorax and with outgrowths, both types of flies were found in $F_1$ and $F_2$ generations and the results of reciprocal crosses are more or less similar. The frequency of sepias mutants with outgrowths on thorax varies from 40 to 60% in $F_1$ and $F_2$ of these crosses. However, the results of reciprocal crosses between sepias mutants with outgrowths and wild type (red eye and normal thorax) flies are different from those of the crosses involving sepias mutants with normal thorax and with outgrowths on thorax. When wild type females were crossed with sepias mutant males with outgrowths, flies with outgrowths on thorax were absent in $F_1$. In the $F_2$ generation of this cross, red-eyed flies with outgrowths and without outgrowths as well as sepias mutants with outgrowths and without outgrowths were found but the frequency of flies with outgrowths was lower (23.58%) as compared to the crosses involving sepias mutants. In the opposite cross (sepias females with outgrowths x wild type males), seven females with very small outgrowths on thorax were found in the $F_1$ generation. In the $F_2$ generation, four types of flies were found and the frequency of flies with outgrowths on thorax was very low (16.75%). Thus the results of different crosses vary and development of outgrowths on thorax occurs in both wild type (red eye) and sepias mutants of *D. bipectinata*.


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A new empirical relation for strong seismic ground motion for the Himalayan region

Ashutosh Aman, Umesh K. Singh and Ramesh P. Singh

Department of Civil Engineering, Indira Institute of Technology, Kanpur 208 016, India

Strong ground motion data from five earthquakes that occurred along the Himalayan range have been taken to study the attenuation characteristics of horizontal peak acceleration and velocity. Using these data, we have found empirical relations for horizontal acceleration and velocity. These empirical relations for peak horizontal ground acceleration and velocity give good fit with the observed strong ground motion in the Uttarkashi earthquake of 20 October 1991. The attenuation relations found in the present study will be useful in estimating the peak horizontal ground acceleration and velocity of future earthquakes and will also be useful in designing earthquake-resistant structures in the Himalayan region.

EARTHQUAKE-resistant design of structures require estimate of the expected ground motions at the earthquake-prone sites. In order to develop ability to reasonably assess the expected ground motion due to future earthquake, it is essential to study the characteristics of strong ground motion recorded in the past earthquakes. Prediction of peak ground acceleration and velocity is useful to obtain an estimate of the outer envelope of the ground motion spectrum. Peak ground motions are important in earthquake safety analysis and in the evalu-