A mutant of *defect of macrochaetae* is temperature sensitive

K. Tsuneizumi*1 and T. Abe*1

Heavy-ion-beam mutagenesis is generally recognized as an effective method for mutation breeding.[1,2] Although this method has yielded successful results with plants, its application in case of animals remains limited. Therefore, we plan to acquire more basic data to set up optimal conditions for the heavy-ion-beam irradiation system by using *Drosophila melanogaster* (fruit fly) as a model.

In our previous study, we determined the suitable condition for the large-scale screening of mutant lines of heavy-ion-beam mutagenesis.[3–5] To elucidate the biological effect of heavy-ion-beam irradiation to the genome, we established several mutants that expressed typical phenotypes on eyes, wings, bodies, and bristles via carbon-ion beam irradiation.

Large mechanosensory bristles, macrochaetae, and small bristles, microchaetae, were observed at stereotypical positions on the thoracic epidermis. *D. melanogaster* had two macrochaetae: anterior drosocentral bristle (aDC) and posterior drosocentral bristle (pDC), on scutum, and two macrochaetae: anterior scutellar bristle (aSC) and posterior scutellar bristle (pSC), on scutellum (Fig. 1).

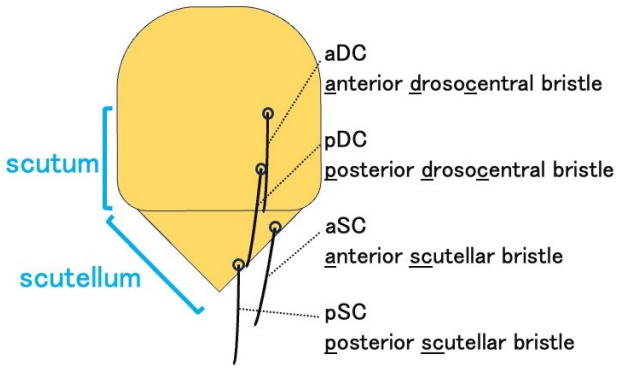

Fig. 1. Diagram of thoracic macrochaetae. The bristles of bristle sensilla are represented by blacklines with circles for the socket cells.

In this report, we show new mutant with abnormal phenotypes in the thoracic bristles. The mutant was established under the condition of 80 keV/μm linear energy transfer at 3 Gy dose level. Complete genome sequence analysis revealed that two uncharacterized genes were identified as candidate for causative genes. Thus, we named the mutant as *defects of macrochaestae* (*doma*). Phenotypes of shortened or missing in pSC were observed under normal conditions of rearing *doma* mutants at 25°C (Fig. 2b). However, when *doma* mutants were maintained at a low temperature (17°C), many macrochaetae (aDC, pDC, aSC, and pSC) were

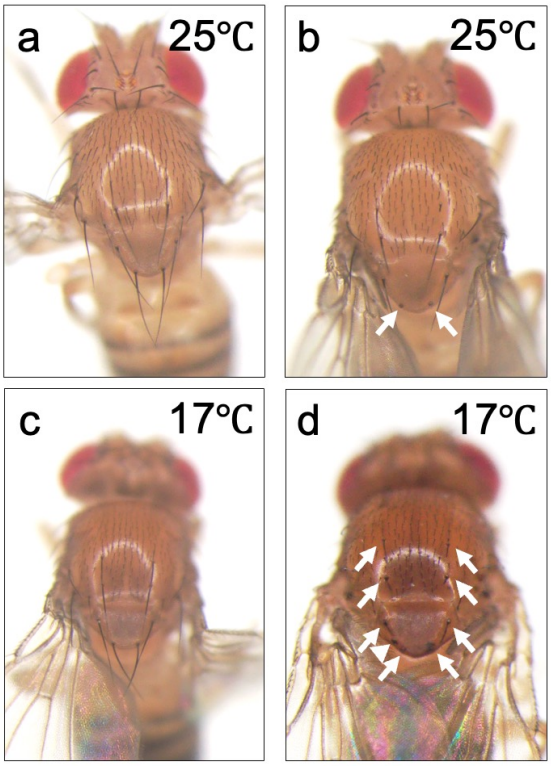

Fig. 2. Abnormal bristles of homozygous mutants. (a, c) Thoracic bristles of wild type cultured at 25°C (a) and 17°C (c). (b, d) Thoracic bristles of homozygous mutants cultured at 25°C (b) and at 17°C (d). Missing or shortened macrochaetae are marked with white arrows. Extra formation of socket cell is marked with white triangle.

shortened or missing. Extra bristles or socket cells were observed rarely (Fig. 2d). These abnormalities were observed only in the macrochaetae and no changes were observed in the microchaetae. These results suggest that the established *doma* mutant is temperature sensitive. We are currently conducting linkage analysis to identify the causative gene from the two candidate genes. We expect that the analysis of the *doma* gene will contribute to understanding the mechanism of formation of macrochaetae, particularly the differences in formation from microchaetae.

References

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*1 RIKEN Nishina Center

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